

ESPR 2023

Published online: 5 June 2023
© Springer-Verlag GmbH Germany, part of Springer Nature 2023

Pediatric Radiology Supplement



ESPR
European Society of
Paediatric Radiology

Founded in 1963

The European Society of Paediatric Radiology

**57th Annual Meeting and 43rd Post Graduate Course of the
European Society of Paediatric Radiology**

**June 5-9, 2023
Belgrade, Serbia**

Table of content

General Information – European Society of Paediatric Radiology

Officers.....	S140
Honorary members	S140
Gold medallists	S141
Awards	S142
Past presidents and meeting sites	S145
Future ESPR meeting	S146
ESPR Honorary Members	S146

ESPR 2023 Honorary Members

ESPR 2023 Introduction to the Annual Meeting

Abstract Book

General Information

European Society of Paediatric Radiology

Officers

President	Karen Rosendahl (Bergen, Norway)
General Secretary	Rick R. van Rijn (Amsterdam, Netherlands)
Treasurer	Stéphanie Franchi-Abella (Le Kremlin Bicêtre, France)
Educational Committee Chair	Maria Raissaki (Heraklion, Greece)
Research Committee Chair	Owen Arthurs (London, United Kingdom)
Publications Committee Chair	Ola Kvist (Stockholm, Sweden)
jESPeR Representative	Julian Jürgens (Hamburg, Germany)
Congress President	Jovan Lovrenski (Novi Sad, Serbia)
Congress Past President	Philippe Petit (Marseille, France)
Congress Future President	Pablo Caro Dominguez (ESPR 2024 Sevilla, Spain)
Council of Trustees	Maria I. Argyropoulou (Ioannina, Greece)
	Catherine M. Owens (London, United Kingdom)
	Philippe Petit (Marseille, France)

Honorary members

1964 J. Caffey USA	1989 B.J. Cremin South Africa
1964 L. Schall Germany	1989 K-D. Ebel Germany
1965 S.R. Kjelberg Sweden	1989 H. Fendel Germany
1965 E.B.D. Neuhauser USA	1989 E.M. Sweet United Kingdom
1966 J. Lefèbvre France	1990 D.R. Kirks USA
1973 H.M. Gefferth Hungary	1991 A. Chrispin United Kingdom
1973 K. Rowinski Poland	1991 E.A. Franken USA
1974 F.N. Silverman USA	1991 D. Nussle Switzerland
1975 U.G. Rudhe Sweden	1991 B.P. Wood USA
1979 J.A. Kirkpatrick, Jr USA	1992 W.E. Berdon USA
1979 A. Lassrich Germany	1993 W. Holthusen Germany
1979 J. Sauvegrain France	1993 J. Lucaya Spain
1982 C. Fauré France	1994 N.C. Perlmutter Belgium
1982 A. Giedion Switzerland	1994 H.G. Ringertz Sweden
1983 E. Willich Germany	1994 D.G. Shaw United Kingdom
1984 R. Astley United Kingdom	1996 R. Lebowitz USA
1987 J. Bennet France	1996 B. Lombay Hungary
1987 O.A. Eklöf Sweden	1997 Y. Briand France
1987 C.A. Gooding USA	1997 N. T. Griscom USA
1987 D.C. Harwood-Nash USA	1997 P. Small United Kingdom
1987 J.F. Holt USA	1998 A. Daneman Canada
1987 A.K. Poznanski USA	1998 G. Kalifa France
1987 H. Taybi USA	1999 M. Grunebaum Israel
1988 H.J. Kaufmann Germany	1999 P. Thomas Ireland
	2000 N. Blake Ireland
	2000 P. Kramer The Netherlands

- 2000 G. Stake Norway
2001 J. Bar-Ziv Israel
2001 R.C. Brasch USA
2001 M. Hassan France
2001 J.L. Strife USA
2002 S. Laurin Sweden
2003 G. Beluffi Italy
2003 H. Carty United Kingdom
2003 B. Parker USA
2003 A. Pelizza Italy
2004 C. Hall United Kingdom
2004 A. Marcinski Poland
2005 U. Willi Switzerland
2005 J.P. Montagne France
2005 G. Farielo Italy
2006 A.E. Oestreich USA
2006 L. Garel Canada
2006 M. Mearadji The Netherlands
2006 F. Brunelle France
2007 R. Fotter Austria
2007 P.A.N. Daltro Brasil
2007 G. Benz-Bohm Germany
2007 M. Spehl-Robberecht Belgium
2008 R. Teele USA (New Zealand)
2008 T. Slovis USA
2008 I. Gassner Austria
2008 J. Fonseca Santos Portugal
2009 R. Schumacher Germany
2009 N. Gourtsoyiannis Greece
2009 I. Boechat USA
2009 S. Chapman United Kingdom
2009 J. Troeger Germany
2009 E. Richter Germany
2010 F. Avni Belgium
2010 V. Donoghue Ireland
2010 P. Toma Italy
2010 F. Diard France
2011 R. De Bruyn United Kingdom
2011 G. Enriquez Spain
2011 C. Garcia Chile
2011 P. Kleinman USA
2011 G. Taylor USA
2012 C. Veyrac France
2013 D. Pariente France
2014 R. Arthur Scotland
2014 M. Haliloglu Turkey
2016 C. Owens United Kingdom
2016 D. Bulas United States
2016 E. Kis Hungary
2017 M. Riccabona Austria
2017 P. Garcia-Peña Spain
2018 M. Argyropoulou Greece
2018 K. Darge United States
2019 K. Rosendahl Norway
2019 R.J. Nivelstein Netherlands
2019 E. Sorantin Austria
2021 R. v.Rijn The Netherlands
2022 C. Adamsbaum France
2022 J.F. Chateil France
- Gold medallists**
- 2007 J. Lucaya Spain
2008 G. Kalifa France
2010 U. Willi Switzerland
2011 R. Fotter Austria
2012 F. Brunelle France
2013 F. Avni Belgium
2014 V. Donoghue Ireland
2015 G. Sebag France
2016 P. Toma Italy
2019 C. Owens United Kingdom

Jacques Lefèbvre awards

1977 H. Ringertz (Norway),	The width of the cranial sutures in the neonate: An objective
1978 L. Garel (France),	Xanthogranulomatous pyelonephritis in children: 19 cases
1979 M. Brauner (France)	Metrizamide myelography in infants with brain injury to the brachial plexus
1980 M. Spehl-Robberecht (Belgium)	Ultrasonic study of pancreas in cystic fibrosis
1981 L. Garel (France)	The renal sinus: An important anatomical landmark in children
1982 A. Couture (France)	Ultrasonographic exploration of cerebral malformations
1983 F. Brunelle (France)	Percutaneous cholecystography in children
1984 C. Veyrac (France)	Ultrasound of normal and pathologic choroid plexus
1985 F. Avni (Belgium)	Ultrasonic demonstration of abnormal and atypical gallbladder content in new-borns
1986 D. Pariente (France)	Biliary tract involvement in children with histiocytosis X
1987 N. Sellier (France)	Focal cortical dysplasia: A rare cause of epilepsy
1988 K-H. Deeg (Germany)	Pulsed doppler sonographic measurement of normal values for the flow velocities in the cerebral arteries of healthy infants
1989 P. Winkler (Germany)	Major pitfalls in the doppler examination of the cerebral vascular system
1990 C. Garel (France)	Laryngeal ultrasonographic study in infants and children: pathological findings
1991 J-P. Pracos (France)	Systematic study of superior mesenteric vessels in abdominal ultrasound
1992 A. Hollman (United Kingdom)	Colour doppler imaging of the acute paediatric scrotum
1993 M. Chami (France)	Ultrasound contribution in the analysis of the new-born and infant normal foot and club foot: Preliminary study
1994 C. Adamsbaum (France)	Vermian agenesis without posterior fossa cyst
1995 G. Sebag (France)	Magnetic resonance angiography of paediatric renal transplants with quantification of allograft blood flow
1996 W.K. Rohrschneider (Germany)	Ultrasound, computed tomography and magnetic resonance imaging characteristics in nephroblastomatosis: Evaluation of 23 patients
1997 L. Hertz-Pannier (France)	Non-invasive preoperative motor mapping in children with brain functional magnetic resonance imaging
1998 N. Nicaise (Belgium)	Dynamic Gd DTPA Enhanced T1W turbo field echo imaging: interest in paediatric renal evaluation
1999 F. Rypens (Belgium)	Fetal lung volume estimation by magnetic resonance imaging: Normal values and potential use
2000 F. Zierysen (Belgium)	Doppler assessment of pulsatility index (PI) of the uterine artery in girls around puberty
2001 M.K. Lidégran (Sweden)	Magnetic resonance imaging and echocardiography in assessment of ventricular function in atrially corrected transposition of the great arteries
2002 M. Cassart (Belgium)	The assessment of fetal uronephropathies by magnetic resonance imaging
2003 N. Boddaert (France)	¹⁸ F-fluoro-L-DOPA positron emission tomography scan in focal forms of hyperinsulinism of infancy
2004 C. Jourdan (Germany)	Ultrasound evaluation of intima-media thickness (IMT) and elastic properties – distensibility, stiffness, and incremental modulus of elasticity – of the common carotid artery as marker of early vascular damage in children with chronic renal failure and reference values
2005 C.J. Kellenberger (Switzerland)	Cardiovascular magnetic resonance imaging for investigating new-borns and infants with congenital heart disease
2006 P. Ou (France)	Magnetic resonance assessment of aortic flow dynamics and aortic arch geometry in patients with successful repair of coarctation of the aorta
2007 C. Sporcq (Belgium)	Reappraisal of the sonographic characteristics of the fetal and new-born kidney: Introducing the cortico-medullary ratio
2008 M.B. Damasio (Italy)	Which is the best imaging modality to capture bone erosions in juvenile idiopathic arthritis?
2009 K. McDonald (United Kingdom)	DWI to assess chemotherapy response in solid tumours
2010 L.S. Ording-Müller (Norway)	Development of the wrist. Normal standards based on magnetic resonance imaging for 6-15-year-olds
2011 C. Duran (Spain)	Voiding urosonography: Normal and abnormal appearance of the urethra
2012 J. Vazquez (Spain)	External manual reduction with US assistance: A new procedure for paediatric idiopathic ileocolic intussusception

2013 A. Viehweger (Germany)	The Gini-coefficient: A new method to assess fetal brain development
2014 S. Kinner (Germany)	Magnetic resonance colonography with diffusion weighted imaging (DWI) in children and adolescents with inflammatory bowel disease (IBD)
2015 J. Shur (United Kingdom)	Size matters – Dose reference levels (DRL's) based on patient thickness, instead of age
2016 L. Laborie (Norway)	Fetal, infant, and childhood growth and acetabular hip dysplasia at skeletal maturity: Findings from a prospective study with follow-up from new-born to adult life
2017 S. Toso (Switzerland)	Diagnostic accuracy of ultrasound, computed tomography and wedge portography in the work-up for mesenterico-rectal bypass in children with extrahepatic portal hypertension
2018 P. Caro Dominguez (Spain)	Magnetic resonance assessment of blood flow distribution in fenestrated and completed Fontan statuses
2019 G. Chambers (France)	Radiological appearances and clinical follow-up of focal nodular hyperplasia in children: A review of 71 patients
2021 J. Herrmann (Germany)	Accelerating whole-body MRI in pediatric patients with Cancer Predisposition Syndrome: Preliminary results
2022 A. Martin-Champetier (France)	Relevance of routine abdominopelvic ultrasound in suspected child abuse in children under 2 years of age: review of 15 years of experience

Poster awards

1994 H. Gomes (France)	Neonatal hip sonography from anatomy to sonography
1995 P. Schmit (France)	Imaging of cystic mesenchymal hematomas of the liver. review of 13 patients
1997 P. Schmit (France)	Congenital hepatic vascular malformations in children
1998 H. Brisse (France)	In utero magnetic resonance imaging normal gyral development of the human brain
2000 M. Valle (Italy)	High-frequency ultrasound detection of the brachial plexus in new-borns and infants
2001 W.K. Rohrschneider (Germany)	Static dynamic magnetic resonance-urography – simultaneous morphological and functional evaluation of the urinary tract
2002 C.M. Owens (United Kingdom)	The utility of magnetic resonance imaging in the assessment of symptomatic adenoidal hypertrophy and rhinosinusitis in children – pre-and-post – medical therapy
2003 R. Schumacher (Germany)	Sonographical anatomy of the anal sphincter complex and levator ani muscle in neonates and infants
2004 H.J. Mentzel (Germany)	Comparison of whole-body short-TI inversion recovery magnetic resonance imaging and ^{99m} Tc-methylene diphosphonate scintigraphy in the examination of children with suspected multifocal bone lesions
2005 G. Enriquez (Spain)	Prenatal assessment of lung hypoplasia in congenital diaphragmatic hernia: correlation between volumetric magnetic resonance imaging and biometric ultrasound measurements
2006 I. Sorge (Germany)	Reduction of radiotherapy in children with early stages of Hodgkin's lymphoma, influenced by a new imaging and fluorodeoxyglucose-positron emission tomography-based strategy
2007 S. Punwani (United Kingdom)	Effects of reducing radiation dose on lung nodule detection
2008 J-F. Chateil (France)	Imaging of acquired spinal cord lesions and spinal canal pathology in children
2009 G.M. Barez (Spain)	Spectrum of Imaging findings in the brachial apparatus anomalies
2010 M. Brun (France)	Diffusion tensor imaging in attention deficits in children treated for posterior fossa tumours: Preliminary results
2011 C. Fonda (Italy)	3T arterial spin labelling in paediatric patients
2012 O. Arthurs (United Kingdom)	Diffusion weighted magnetic resonance imaging of the fetal brain in intrauterine growth restriction.
2013 C. Duran (Spain)	Voiding urosonography: A pictorial essay of the lower urinary tract pathology
2014 A. Tanase (France)	Ultra low dose imaging for the follow up of idiopathic scoliosis: Feasibility of spinal 3D reconstructions and reproducibility of 3D parameters reproducibility. A pilot study
2015 M. Napolitano (Italy)	Magnetic resonance assessment of Crohn's disease activity in a paediatric population correlation with clinical index of disease
2015 D. Kljucsek (Slovenia)	Contrast-enhanced ultrasound (CEUS) of bowel wall with quantitative assessment of Crohn's disease activity in child: a case report
2016 J. Adu (United Kingdom)	Early onset infantile inflammatory bowel disease

- 2016 J.E. Park (Korea) Three-dimensional, T1-weighted gradient-echo imaging of the brain with a radial sampling of k-space: An alternative technique to reduce motion artefacts in breathless children
- 2017 H. Joo Shin (Korea) Liver Intravoxel incoherent motion diffusion-weighted imaging for hepatic steatosis and fibrosis in children
- 2017 M. Cristallo Lacalamita (Switzerland) Imaging of cancer therapy related toxicities in children: A pictorial essay
- 2018 D.M. Renz (Germany) Is there a T1 weighted signal increase within the dentate nucleus and the globus pallidus after serial application of Gd-DTPA versus gadobutrol in paediatric populations?
- 2018 A. Barakat (United Kingdom) A resident's guide to paediatric rhabdomyosarcoma: a pictorial review
- 2019 L. R. Martin (Spain) Magnetic resonance imaging of cardiomyopathies in childhood
- 2019 A. S. Linhares Moreira (Portugal) The good and the bad in paediatric thoracic computed tomography radiation dose – The experience of our centre
- 2021 M. Navallas (Spain) Practical approach to MRI of the temporomandibular joint In Juvenile Idiopathic Arthritis
- 2021 M. Born (Germany) Feasibility of assessing systemic oxalosis by MRI
- 2022 FM Callaghan (Switzerland) Artificial Intelligence segmentation of pediatric MR urography
- 2022 A. Ntorkou (France) Imaging of the middle and inner ear in syndromic hearing loss

Young researcher awards

- 2003 M. Brun (France) Phonological decoding in dyslexic children: activation pattern in functional magnetic resonance imaging
- 2004 A.B. Barnacle (United Kingdom) Image-guided percutaneous biopsy of soft tissue masses in children
- 2005 M. Raissiki (Greece) Eye-lens bismuth shielding in paediatric head computed tomography examinations
- 2006 I. Sorge (Germany) Reduction of radiotherapy in children with early stages of Hodgkin's lymphoma, influenced by a new imaging and fluorodeoxyglucose-positron emission tomography-based strategy
- 2007 M. Alison (France) In vivo targeting of macrophagic activity with magnetic resonance imaging contrast agent (USPIO) in an experimental model of neonatal brain lesions
- 2008 J. Herrmann (Germany) Capsular arterial collateralisation after paediatric liver transplantation
- 2010 O. Arthurs (United Kingdom) Magnetic resonance voiding cystourethrography for vesico-ureteric reflux in unsedated infants
- 2011 N. Gupta (United Kingdom) Predictors of vesicoureteric reflux in infants with UTI using NICE criteria
- 2012 L.B. Laborie (Norway) Associations between femoroacetabular impingement and hip dysplasia as demonstrated radiographically. Preliminary results
- 2013 N. Lochbühler (Switzerland) Magnetic resonance imaging assessment of inflammatory activity and mandibular growth following intra-articular TMJ steroid injection in children with JIA
- 2014 A. Slaar (The Netherlands) A clinical decision rule for acute wrist trauma in children
- 2015 S. Shelmerdine (United Kingdom) Achondroplasia: Really Rhizomelic?
- 2016 M. Paddock (United Kingdom) What is the value of spine, hand and foot radiographs as part of the skeletal survey for diagnosing suspected physical child abuse?
- 2017 V. Della Valle (France) Pulmonary Langerhans Cell Histiocytosis in children
- 2018 B. Vaarwerk (Netherlands) Does surveillance imaging lead to earliest detection of relapse and thus to improved survival in paediatric patients with RMS? The European experience
- 2019 P. Zadig (Norway) Bone marrow signal on Whole Body magnetic resonance imaging in healthy, asymptomatic children. Establishing novel reference standards
- 2021 J.N. Van der Beek (Netherlands) Direct correlation of MRI with histopathology in pediatric renal tumors through the use of a patient-specific 3D-printed cutting guide: A pilot study
- 2022 R. Meshaka (United Kingdom) Lateral radiographs: do they improve fracture detection in physical abuse?
- 2022 M. Olsen-Fossmark (Norway) The prevalence of clinically silent cerebral haemorrhage in children with increasing head circumference

President's awards

2004 A.K. Kilian (Germany)	Prenatal magnetic resonance lung volumetry of congenital diaphragmatic hernia: Comparison with the clinical outcome and the necessity of extracorporeal membrane oxygenation (ECMO)
2005 A. Larke (Ireland)	Magnetic resonance imaging findings as an indication of underlying genetic lesions in congenital malformations of the brain
2007 C. Duran (Spain)	Voiding cystosonography for the study of the urethra
2008 A. Calder (United Kingdom)	Computed tomography compared with ultrasound and chest radiography in children with pleural empyema
2009 E. Senocak (Turkey)	Magnetic resonance imaging and DWI findings in children with hemophagocytic lymphohistiocytosis: tendency for symmetry
2010 S. Franchi-Abella (France)	Congenital portosystemic shunt: Complications and outcome after closure. About 19 paediatric cases
2011 S. Punwani (Greece)	Magnetic resonance imaging vs. positron emission tomography/computed tomography for detection of focal splenic lesions in paediatric and adolescent lymphoma at initial staging
2012 P. Xenophontos (Greece)	Detection of primary sclerosing cholangitis (PSC)-type lesions in children with inflammatory bowel disease via magnetic resonance cholangiopancreatography: A relative risk measures analysis
2013 G. Pasztor (Hungary)	The importance of pyelectasis: Report of a clinical study in progress
2014 A.S. Littooi (The Netherlands)	Whole-body magnetic resonance imaging for staging of paediatric lymphoma: Prospective comparison to an fluorodeoxyglucose-positron emission tomography/computed tomography -based reference standard
2015 C. Wieser (Austria)	Vessel flexibility index as a new marker for cardio-vascular disease: A pilot study
2016 L.K. Suther (Norway)	Image quality assessment of 3T magnetic resonance coronary Angiography (3D SSFP) In patients operated for transposition of the great arteries with three qualitative methods
2017 R. Gnannt (Switzerland)	Increased risk of venous thrombosis of the arm with multiple peripherally inserted central catheters insertion in paediatric patients
2018 D. Dünger (Germany)	Do we need gadolinium-based contrast medium for brain magnetic resonance imaging in children?
2021 L. Anfigeno (Italy)	Diffusion-weighted MRI in the evaluation of renal parenchymal involvement during febrile urinary tract infections in children: Preliminary data
2022 L. Cardoen (France)	Fat-containing soft-tissue tumors in children, adolescents and young adults: which one to biopsy?

Innovation awards

2021 H. Hebelka (Sweden)	Shear Wave Elastography has potential to classify non-fibrotic liver tissue in children with suspected or established liver disease non-invasively: A prospective study with histologic correlation
2022 L. Tanturri de Horatio (Italy)	A novel MRI scoring system for active and chronic changes in children with juvenile idiopathic arthritis of the hip.

Past presidents and meeting sites

1964 J. Lefèbvre, Paris/France	1974 P.E. Heikel, Helsinki/Finland
1965 U.G. Ruhde, Stockholm/Sweden	1975 K. Knapp, Madrid/Spain
1966 J. Sutcliff, London/United Kingdom	1976 O. Eklöf, Stockholm/Sweden
1967 H.J. Kaufmann, Basel/Switzerland	1977 A. Giedion, Lucern/Switzerland
1968 A. Lassrich, Hamburg/Germany	1978 N. Perlmutter-Cremer, Brussels/Belgium
1969 K. Rowinsky, Warsaw/Poland	1979 K.D. Ebel, Cologne/Germany
1970 G. Iannacone, Rome/Italy	1980 The Dutch Group of Paediatric Radiologists, The Hague/The Netherlands
1971 G. Thomsen, Copenhagen/Denmark	1981 G. Stake, Oslo/Norway
1972 J. Sauvegrain, Paris/France	1982 A. Rubin, Prague/Czechoslovakia
1973 R. Astley, Birmingham/United Kingdom	1983 C. Fauré, Paris/France
	1984 G.F. Vicchi, Florence/Italy

- 1985 E. Sweet, Glasgow/Scotland
 1986 J. Lucaya, Barcelona/Spain
 1987 D. Lallemand (ESPR) and D. Harwood-Nash (SPR),
 Toronto/Canada
 1988 D. Nusslé, Montreux/Switzerland
 1989 N. Blake, Dublin/Ireland
 1990 H. Fendel, Munich/Germany
 1991 H.G. Ringertz (ESPR) and D. Kirks (SPR), Stockholm/
 Sweden
 1992 B. Lombay, Budapest/Hungary
 1993 D.G. Shaw, London/United Kingdom
 1994 F. Avni, Brussels/Belgium
 1995 P. Kramer, Utrecht/The Netherlands
 1996 P. Thomas, (ESPR) and K. Fellows (SPR) Boston/
 United States
 1997 U. Willi, Lugano/Switzerland
 1998 B. Theodoropoulos, Rhodes/Greece
 1999 J. Bar-Ziv and G. Kalifa, Jerusalem/Israel
 2000 J. Fonseca Santos, Lisbon/Portugal
 2001 F. Brunelle (ESPR) and J. Strife (SPR), Paris/France
 2002 T. Nordshus, Bergen/Norway
 2003 P. Toma, Genoa/Italy
 2004 J. Troöger, Heidelberg/Germany
 2005 V. Donoghue, Dublin/Ireland
 2006 R. Fötter (ESPR) and G. Taylor (SPR), Montreal/
 Canada
 2007 G. Enríquez, Barcelona/Spain
 2008 S. Chapman, Edinburgh/United Kingdom
 2009 M. Haliloglu, Istanbul/Turkey
 2010 J.F. Chateil, Bordeaux/France
 2011 C.M. Owens (ESPR) and D. Bulas (SPR) London/
 United Kingdom
 2012 M.I. Argyropoulou, Athens/Greece
 2013 E. Kis, Budapest/Hungary
 2014 R.A.J. Nievelstein, Amsterdam/Netherlands
 2015 M. Riccabona and E. Sorantin, Graz/Austria
 2016 K. Rosendahl (ESPR) and J. Donaldson (SPR),
 Chicago/United States
 2017 J. Schneider and G. Eich, Davos/Switzerland
 2018 F.-W. Hirsch, Berlin/Germany
 2019 K. Lauerma and R. Seuri, Helsinki/Finland
 2021 A. Rossi (ESPR) and D. Grattan-Smith (SPR), Rome/
 Italy
 2022 Ph. Petit, Marseille/France

Future ESPR meeting

ESPR 2024, Seville, Spain, June 3-7, 2024

Honorary Members 2023

Claudio Granata



Dr. Claudio Granata was born in 1960 in Brescia, Italy and attended Medical School at the University of Pavia, graduating in 1985. After completing his graduation, he became a resident in General Surgery completing his training in 1990 thence beginning his career working as paediatric surgeon at the IRCCS Giannina Gaslini Childrens' Hospital in Genoa. He subsequently spent a year as Senior Research Fellow at the Children's Research Center of the Our Lady's Hospital for Sick Children in Dublin (IRL).

So, in 2000, after publishing in paediatric surgery as first author in various international journals - he decided it was time for a change, being fascinated by the complexity of diagnostic imaging and its close link to fast evolving technologies. In 2001, he started his new career at the Department of Paediatric Radiology of Giannina Gaslini Hospital under the mentorship of Dr. Paolo Tomà, who has always provided him with superb guidance and advice. During his career as a radiologist at Giannina Gaslini Hospital he developed his skills in the many varied subspecialties within paediatric radiology with a special interest in oncologic imaging, cooperating with SIOPEN (International Society of Paediatric Oncology European Neuroblastoma Research Network) in the creation of important imaging guidelines for new protocols for the management of children with neuroblastoma.

Since the beginning of his career as paediatric radiologist Dr. Granata developed a special dedication to radiation protection of children, who are potentially more prone to the untoward effects of radiation exposure. On behalf of SIRM (Italian Society of Medical and Interventional Radiology) he was responsible of establishing the first Italian diagnostic reference levels for CT studies in children, which were endorsed by the Italian Ministry of Health in 2017.

Since 2013 he has represented ESPR within the ESR EuroSafe Imaging group, being responsible for the Euro-safe Paediatric Imaging working group and a core member of the EuroSafe Steering Committee. On behalf of ESPR and as chair of ESR EuroSafe Paediatric Imaging working group, he collaborated in drafting the RP185 document by the European Commission on the European Guidelines on Diagnostic Reference Levels for Paediatric Imaging. He participated in the creation of a European consensus document on patient contact shielding, was responsible for the European survey on the use of patient contact shielding in Europe and another survey on the availability and use of imaging guidelines amongst European radiologists.

Presently, as ESPR representative – he is involved in the European Commission project ROCC-N-ROLL aimed at the creation of a strategic research agenda in the field of medical applications of ionizing radiations and related radiation protection.

Thanks to his expertise in radiation protection, Dr. Granata has been invited as lecturer to many international congresses and courses. Presently, he is also responsible of the ESPR CT & Dose Task Force, part of the ESPR Research Committee and of the editorial board of *Pediatric Radiology*.

Dr. Granata is also very active in research within many areas of Paediatric Radiology and has published more than 100 scientific papers, with a Scopus h-Index of 26 and 2303 citations.

In 2020, he was appointed Head of the Paediatric Radiology Department at the Institute for Maternal and Child Health - IRCCS “Burlo Garofolo” in Trieste.

Claudio is a true polymath, and of course has a life outside of work. He enjoys (– not necessarily in this order –) sleeping, sailing, driving classic and sport cars, fixing and restoring old transceivers for radioamateurs, and reading. They say behind every great man there is a great woman and for the last 30 years he has shared his life with his much beloved partner Rita, a pillar of support and a bastion of love and patience.

Claudio is an understated, humble, hardworking man who has represented Paediatric radiology in many vital areas within, and in collaboration with important allied societies, allowing our society much respect and admiration. Hence he is truly deserving of Honorary membership of ESPR.

Catherine Owens

Trustee, ESPR

James Scott Donaldson



Professor Donaldson qualified in medicine from the Loma Linda University Medical School, California in 1978, and later trained in Radiology at the same university. He then subspecialised in Paediatric Radiology at Children’s Hospital of Los Angeles, and in Interventional Radiology at the University of California in San Diego. From 1985 he has worked at Ann & Robert H. Lurie Children’s Hospital of Chicago (formerly Children’s Memorial Hospital), and member of the faculty of Feinberg School of Medicine at Northwestern University. He held many administrative positions in the children’s hospital including Chair of the Department of Medical Imaging from 2000-2020. He introduced interventional radiology to the children’s hospital and helped promote pediatric IR throughout the pediatric radiology community. He has, during the past decades, contributed significantly to enhance pediatric radiology through numerous committees, advisory councils and networks, both locally, nationally and internationally.

Nationally, he has in particular been an active contributor to pediatric oncology, cardiovascular imaging and intervention, through the ACR IR Standards Committee, amongst others. In 2006/7 he was President of the Society of Chairs of Radiology Departments of Children’s Hospitals (SCORCH),

and in 2007 he became member of the inaugural board of the Society of Pediatric Interventional Radiology (SPIR) and a year later the founding president of this new international organization. His outstanding contributions over many years has been recognized by the Society of Pediatric Interventional Radiology; Gold Medal Award.

Jim says one of the biggest highlights of his career was in 2016 co-hosting with ESPR president Karen Rosendahl a successful International Congress of Paediatric Radiology (IPR) in Chicago, after having served as secretary of the Society for Pediatric Radiology (SPR) in 2010–2013, vice president from 2014–15 and president from 2015–16.

Professor Donaldson has a long and distinguished academic career. Early on, he took an interest in education and research, and in 1986 he was appointed assistant professor of Radiology at the Northwestern University Medical School. He pursued his academic interests, and from 1994 onwards, he has held a position of Professor of Radiology at the Feinberg School of Medicine Northwestern University. He has published nearly 90 papers in international reputable journals, written 24 book chapters and has been a reviewer and collaborator for many different national and international medical journals including AJR, RadioGraphics, The Child's Doctor, Pediatric Radiology, Radiology, Journal of Vascular and Interventional Radiology and many more.

Jim is an international celebrity lecturer, with multiple visiting professorships and numerous lectures and presentations in high profile national and international congresses. He has mentored numerous young radiologists and contributed to the annual ESPR meetings over nearly three decades.

Prof. Donaldson has been a dedicated paediatric radiologist for many years, helping, training and inspiring young doctors, collaborating with colleagues, and being actively involved in developing Paediatric Radiology both nationally and internationally. It is a pleasure to award him honorary membership of a Society to which he has contributed so much over a very distinguished career.

Karen Rosendahl
President, ESPR

Dear colleagues and friends,

The **57th ESPR Annual Meeting & 43rd Postgraduate Course in Belgrade, Serbia from 5-9 June 2023 is ahead of us.**

It is our great privilege to organize this **most important meeting in European paediatric radiology** only for the second time in Southeast Europe (SEE). Therefore, in parallel with the **ESPR meeting global relevance**, this event has been seen as **a chance for**

a generation of paediatric radiologists in the SEE region to leap forward, speed up their development and catch up with the most contemporary knowledge and practices in paediatric radiology worldwide. We trust this goal will be achieved.

The **motto** of the ESPR 2023 is "**Building new bridges**". We emphasize the need for further **enhancing relations between SEE paediatric radiology with the rest of the world** and the need for continual growth of interdisciplinary relations, while the **importance of clinical-radiological cooperation has been highlighted**. A number of sessions were structured to include a clinician, paediatrician or paediatric surgeon, to point out the clinical issues and aspects of what radiologists do, with a goal to improve our mutual understanding.

The most current topics of paediatric radiology and the potentials of their application in our daily practice have been covered in more than 60 sessions, plenary lectures, workshops and other attractive conference formats. Almost 100 international and regional leaders in different domains of paediatric radiology will enrich us with their expertise and experience, as invited speakers and panellists. Hundreds of **colleagues from all over the world will join us on this occasion.**

We are certain that **you will benefit from this meeting in many different ways**, getting the best of state-of-the-art practices, exchanging knowledge and experience, strengthening existing and creating new professional and personal relationships, and also having some time to enjoy in Belgrade vibrant and dynamic life, widely recognized internationally.

With this in mind, we wish you a warm welcome!



Polina Pavićević

Prof. Polina Pavićević
Congress President



Prof. Jovan Lovrenski
Congress President

Scientific Oral Abstracts

Wednesday 7th 15.30h–17h

Neuroradiology and Fetal Imaging Session

MRI and Neurosonogram correlation of paediatric brain with dystocia

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Balakrishna P Shetty², Karthik Hegde³

1. Sri Devraj Urs Academy of Higher Education and Research Tamaka, Kolar, Karnataka 563103, India
2. Siddartha Academy of Higher Education Tumakuru, karnataka, India
3. Focus diagnostics and research center Bengaluru, Karnataka, India

Objectives: Evaluation of all the paediatric brain conditions related to dystocia with MRI and Neurosonogram. Correlation of complementary findings in early neonatal period. Assessment and evaluation of prognostic response in each conditions

Methods and Materials: Paediatric brain MRI evaluation in all suspected cases of dystocia. Over 40 cases were studied with MRI and followed by Neurosonogram correlation. Both findings were evaluated separately and followed up for prognosis. Conditions related to birth trauma are assessed and tabulated as superficial and deep injuries. Standard MRI sequences are used along with 3D high resolution sequence. Followed by Neurosonogram using high and low frequency probes.

Results: There are a wide range of conditions related to birth trauma, ranging from superficial and minor injuries through to fatal injuries. Most common superficial injuries were cephalohematoma and Caput succedaneum. Fracture skull was not so common. Periventricular leukomalacia, parenchymal hemorrhage, subdural and extradural hemorrhage were seen and follow-up. Germinal matrix hemorrhage and intraventricular extension. Hypoxic ischemia is most common deep injuries.

Conclusion: MRI evaluation of neonatal brain with dystocia gives you sufficient information related to brain injuries. Neurosonogram is adjuvant technique helps in confirming the MRI findings and also helps in identify new lesions undetected in MRI. Neurosonogram being a dynamic study helps in identifying inconspicuous findings which are not detected in standard MRI sequences.

An easy applicable brain myelin quantification method

Efstratios Karavasilis¹, Chrisovalantis Stylianou², Marilena Chatzaki², Vasiliki Varlami³, Karafyllia Tziagkana², Savas Deftereos^{1,2}

1. Medical School, Democritus University of Thrace, Alexandroupolis, Greece
2. Department of Radiology, University General Hospital of Alexandroupolis, Alexandroupolis, Greece
3. Premature Neotote Unit, University General Hospital of Alexandroupolis, Alexandroupolis, Greece

Background: Brain myelination is crucial for normal brain function and it is frequently estimated as an brain development index in premature infants. There is an increased interest in the development of advanced imaging techniques and quantitative measures to assess the myelination progress which are not available or easy applicable at the most of the clinical MRI scanners. In our study, we developed an easy quantitative method to evaluate the brain myelination using the conventional MRI techniques.

Material and Methods: Thirty normal premature infants without neurological deficits were performed brain MRI exams in a 1.5T MRI system using the same examination routine protocol encompassing T2 turbo spin echo weighted and diffusion weighted images. Two raters had drawn ROIs in twelve anatomical brain regions including bilateral thalamus, frontal and parietal regions on T2 weighted images and on Apparent Diffusion Coefficient (ADC) maps. Data had high inter-rater agreement. A linear regression model was applied to identify correlation between the T2 and ADC ROIs' derived values and the corrected gestation age using SPSS.

Results: We found statistically significant linear correlations between T2 signal values and the corrected gestation age and also between ADC values and gestation age at $p < 0.05$. There were also derived the equations and the diagrams that depict their associations.

Conclusions: We demonstrate a non-sophisticated quantitative method to create a MRI system-specific normal diagrams from conventional imaging techniques in order to identify the normal and abnormal brain myelination in premature infants. Our method has to be evaluated in different scanners and in larger databases.

Cerebral Blood Flow Patterns in Preterm and Term Neonates Assessed with Pseudo-Continuous Arterial Spin Labeling Perfusion MRI

Eleonora Piccirilli¹, Antonello Chiarelli¹, Carlo Sestieri¹, Daniele Mascali¹, Darien Calvo Garcia¹, Richard G. Wise¹, Antonio Ferretti¹, Massimo Caulo¹

1. Department of Neuroscience, Imaging and Clinical Sciences, University of Chieti, Chieti, Italy

Background and Purpose: In preterm newborns, perfusion disturbances may predispose to abnormal brain maturation even without overt brain injury, highlighting the potential role of CBF as a biomarker of brain developmental dysfunction. We evaluated modifications of CBF patterns assessed with pCASL in preterm (PT) and full-term (FT) infants using a data-driven model.

Materials and Methods: Around term, 82 PT (<37 weeks GA at birth, GAB) and 55 FT (>37 weeks GAB) without major neonatal morbidity prospectively underwent the same standardized protocol on a 3T, including a pCASL. PT were screened for prematurity-related brain injury (GMH and PVL). PT were stratified into those without (PTH, further divided in: Early PT, PTHE: <28 weeks; Moderate PT, PTHM: 29-32 weeks; Late PT, PTHL: 33-36 weeks) and with prematurity-related brain injury (PTPVL and PTGMH). Grey matter CBF (CBFGM) was extracted from 90 ROIs of the UNC Infant Atlas and normalized through z-scoring (computing nCBFGM, expressed in units of SD from global CBFGM). ROIs were then combined using hierarchical clustering (HC). One-way ANOVAs were run to assess differences in nCBFGM within the clusters as a function of prematurity and prematurity-related brain injuries. Pearson's correlation was used to evaluate the relationship between GAB and nCBFGM.

Results: HC identified 4 main clusters of ROIs: Fronto-Temporal, Parieto-Occipital, Insular-Deep Grey Matter and SensoriMotor. SensoriMotor and Insular-DGM had the highest CBF (13.2 and 11.9 ml/100g/min), while Parieto-Occipital and Fronto-Temporal were the least perfused (10.2 and 8.5 ml/100g/min). nCBFGM was above 0 in SensoriMotor and Insular-DMG (.94 and .48; $p < 10^{-4}$), and below 0 in Fronto-Temporal (-.78; $p < 10^{-4}$). In Fronto-Temporal, nCBFGM was higher in FT compared to all PTH subgroups ($p < .05$), with a positive association between nCBFGM and GAB ($r = .37$; $p < .01$), and higher in PTPVL compared to PTH ($p < .05$). In SensoriMotor, nCBFGM was lower in FT compared to all PTH subgroups ($p < 10^{-3}$) and negatively associated with GAB ($r = .42$, $p < 10^{-3}$). In Insular-DMG, nCBFGM was higher in PTH compared to PTPVL ($p < .05$) and PTGMH ($p < 0.1$).

Conclusions: CBF around term distributes heterogeneously in full-term and preterm infants and is differentially affected by prematurity and prematurity-related brain injury, suggesting different metabolic demands and developmental trajectories.

Isolated hypogonadotropic hypogonadism in adolescence: Do we need to measure pituitary gland? A retrospective MRI study

Ercan Ayaz^{1,2}, Ruken Yildirim^{1,2}, Canan Celebi^{1,2}, Sercan Ozakkak^{1,2}

1. Department of Radiology, Diyarbakir Children's Hospital, Diyarbakir – TR

2. Department of Pediatric Endocrinology, Diyarbakir Children's Hospital, Diyarbakir - TR

Background: Rapid changes in the size of the pituitary gland occur during the pubertal period. Therefore, measuring and reporting magnetic resonance imaging (MRI) in adolescents with pituitary disorders can cause unease among radiologists. Our aim was to compare the size of the pituitary gland, stalk and other previously described imaging tools in patients with isolated hypogonadotropic hypogonadism (HH) versus adolescents with a normal pituitary gland.

Methods: Forty-one patients (22 female, 19 male, mean age 16.3 ± 2.0 years, range between 12.8 and 21.1 years) with HH who underwent MRI prior to starting hormone treatment were enrolled. Age, sex, and genetic mutations (if available) were noted. Pituitary height, width on the coronal plane, anteroposterior (AP) diameter on the sagittal plane, stalk thickness, pons ratio (PR), clivus canal angle (CCA) and Klaus index (KI) were measured by two radiologists twice with a one-month interval blinded to each other and patient information. Measurements were compared with the control group, including 83 subjects with normal hypothalamic-pituitary-gonadal axis and normal pituitary gland on MRI. Inter-rater and intra-rater agreements were also evaluated with the intraclass correlation coefficient.

Results: No significant differences were found between the two groups regarding height, width or AP diameter ($p = 0.437, 0.836, 0.681$ respectively). No significant differences were found between the two groups regarding CCA and PR ($p = 0.890, 0.412$ respectively). The KI of the male patients was significantly higher than that of the female patients and the control group ($p < 0.001$). Four patients (9.76%) in the patient group had an organic lesion on pituitary MRI; three of those were Rathke cleft cysts (pars intermedia cysts), and one lesion was a partial empty sella. The interrater agreement was moderate for pituitary height and width, poor for pituitary AP diameter and stalk thickness, good for PR and KI, and excellent for CCA.

Conclusions: The measurements of the pituitary gland, stalk and posterior fossa structures were similar in adolescents with or without isolated HH. Therefore, only evaluating structural abnormalities and lesions seems to be sufficient in these patients and measurements are unnecessary when evaluating normal appearing pituitary gland on MRI.

Intraoperative MRI assessment of the tissue damage during laser ablation of Hypothalamic Hamartoma

Felice D'Arco¹, Sophie Lombardi¹, Domenico Tortora¹, Stefania Picariello¹, Sniya Sudhakar¹, Alessandro Consoles¹, Enrico De Vita¹, Lino Nobili¹, Martin Tisdall¹

1. Great Ormond Street Hospital for Children Gaslini Children's Hospital - Genova -Italy

Background: Laser ablation for treatment of hypothalamic hamartoma (HH) is a minimally invasive and effective technique used to destroy hamartomatous tissue and disconnect it from the functioning brain. Currently, the gold standard to evaluate the amount of tissue being “burned” is the use of heat maps during the ablation procedure. However, these maps have low spatial resolution and there are no data correlating them with the effective tissue destruction on follow-up imaging. The aim of this study is to use different MRI sequences immediately after each laser ablation, and correlate the extensions of signal changes with the volume of malacic changes in a long term follow-up scan.

Material and methods: During the laser ablation procedure we imaged the hypothalamic region with high resolution axial diffusion weighted images (DWI) and T2 weighted image (WI) after each ablation. At the end of the procedure we also added a post-contrast T1WI on the same region.

We then correlated the product of the maximum diameters on axial showing signal changes (acute oedema on T2WI, DWI restriction rim, DWI hypointense core and post-contrast T1WI rim) with the product of the maximum diameters on axial of the malacic changes (on T2 WI) in the follow-up scan, both as a fraction of the total area of the hamartoma.

Results: The area of the hypointense core on DWI acquired immediately after the laser ablation statistically better correlated with the final area of encephalomalacia while T2WI, hyperintense DWI rim and T1WI rim of enhancement tend to overestimate the actual damage and may bias the decision-making during the ablation, stopping the procedure before enough damage has been done.

Conclusions: The use of intraoperative sequences (in particular DWI) during laser ablation, can give to the surgeons valuable information in real-time about the affecting damage on the hamartomatous tissue, with better spatial resolution in comparison to the thermal maps.

Do children with suspected inflicted skull fractures really need an MRI?

Dr. Harriet Edwards¹, Dr. Caren Landes¹

1. Alder Hey Children's Hospital, Liverpool, UK

Background: The Royal College of Radiologists (RCR) published updated joint guidelines for suspected physical injury in children in 2018. With regards to cross-sectional neuroimaging, it states that all skull fractures should be

followed up with MRI imaging, however there is no reference to support this.

We audited all CT heads performed in children under 2 for both explained and unexplained injury at our tertiary children's hospital, to assess the management of skull fractures with and without intracranial pathology and assess whether we were following the current national guidelines.

Method: A CRIS database search was carried out to identify all CT heads performed over two years at our hospital with a clinical indication relating to suspected physical abuse or head trauma.

Clinical history, radiology report, further imaging and patient management was reviewed, including the time interval between scans for all patients with skull fractures.

Result: 174 patients were included from a search between September 2018 and November 2022. 102 patients had unexplained injuries requiring CT head and 22 of these fulfilled criteria for further MRI imaging. 72 head injuries that had a CT were considered to have explained mechanisms.

Of the unexplained injuries reaching criteria for MRI, 15 were isolated skull fractures and an MRI was recommended by the radiologist in one report. Two patients had fractures with underlying haemorrhage and five had intracranial haemorrhage only.

All patients with intracranial haemorrhage went on to have MRI, but only one of the 15 patients with isolated skull fractures had further MRI imaging. No patients had CT to follow-up fractures.

Conclusions: Patients with unexplained injuries and found to have a skull fracture on CT head are recommended by the RCR to have further MRI imaging. In our tertiary centre we found only one out of 15 patients followed guidelines and the MRI was normal. No further imaging or complications were found on review of all included patients with skull fractures.

We therefore propose that MRI brain imaging following isolated skull fracture in unexplained injury, which requires general anaesthetic or sedation, is not a necessary recommendation without firm evidence to suggest otherwise.

Frequency of Cerebellar-Thalamic Circuit Involvement in Term Hypoxic-Ischemic Injury and Relationship to MRI Pattern of Injury

Luis Octavio Tierradentro-Garcia, MD¹, Shyam Venkatakrishna, MD¹; Parth Sharma²; Cesar Augusto Alves¹, MD, PhD; Mohamed Elsingerly, MD¹; Fikadu Worede, MD¹; Jelena Curic BA, MBA²; Savvas Andronikou, MD, PhD^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, USA.

2. Department of Radiology, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

Purpose: Specific brain imaging patterns are associated with timing, duration, and severity of insult in children

with prior hypoxic-ischemic injury (HII). Cerebellar injury has not been adequately evaluated in term HII regarding known patterns of injury. We aimed to evaluate associations between cerebellar-thalamic circuit injury and known magnetic resonance imaging (MRI) patterns of HII. **Materials and Methods:** This retrospective, observational study included children aged 0–18 years with term HII as demonstrated on delayed MRI. A pediatric neuroradiologist evaluated the MRI patterns of injury and classified them into the following categories: 1) basal ganglia-thalamus (BGT), 2) watershed (WS), 3) combined (BGT/WS), and 4) multi-cystic. We determined the frequency of cerebellar involvement (T2/FLAIR as hyperintensity and/or atrophy of hemispheres and/or vermis). A researcher blinded to results on cerebellar involvement assessed the presence of thalamic injury in the following nuclear groups: 1) ventrolateral nuclei (VLN), 2) pulvinar, 3) anterior, and 4) medial. We evaluated the association of cerebellar injury with 1) each MRI pattern of injury and 2) the presence and location of intra-thalamic injury using chi-square. **Results:** Of 1175 children (mean age 6 years) with term HII, 252 (21%) had cerebellar injury. The vermis was more commonly affected (n=209, 83%) than the cerebellar hemispheres (n=86, 34%); hemispheres and vermis were involved in 43 children (17%). Cerebellar injury was significantly associated with a combined BGT/WS pattern (p=0.03). Of the children with cerebellar injury, 226 (90%) had a concomitant thalamic injury, most commonly involving the VLN (n=97, 39%). Vermian injury was associated with VLN injury [OR 35.7 (95% CI 4.8–264.1), p<0.001]. Hemispheric injury was associated with injury in any other thalamic region [OR 3.3 (95% CI 1.9–5.7), p<0.001]. **Conclusions:** Cerebellar injury was frequently identified in children with HII on delayed MRI and mainly involved the vermis. Vermian injury was associated with thalamic injury in the VLN. These associations may be explained as occurring upstream or downstream along synaptic networks through post synaptic injury and/or Wallerian degeneration, depending on the type of insult. Further research, including prospective longitudinal studies assessing clinical outcomes, are needed to evaluate the clinical utility of these injury patterns.

Image Quality Transfer can improve the contrast and lesion characterisation in low-field MRI

Matteo Figini^{1,2}, Hongxiang Lin^{1,2,3}, Felice D'Arco⁴, Godwin Ogbole⁵, Maria Camilla Rossi Espagnet⁶, Olalekan Ibukun Oyinloye⁷, Joseph Yaria⁸, Donald Amasike Nzeh⁷, Mojisola Omolola Atalabi⁹, Lisa Ronan^{1,2}, David W Carmichael^{10,11}, Judith Helen Cross^{11,12}, Ikeoluwa Lagunju¹³, Delmiro Fernandez-Reyes^{2,13}, and Daniel C Alexander^{1,2}

1. Centre for Medical Image Computing, University College London, London, United Kingdom

2. Computer Science, University College London, London, United Kingdom
3. Research Center for Healthcare Data Science, Zhejiang Lab, Hangzhou, China.
4. Radiology, Great Ormond Street Hospital for Children, London, United Kingdom
5. Radiology, College of Medicine, University of Ibadan, Ibadan, Nigeria
6. Neuroradiology, Sapienza University, Rome, Italy
7. Radiology, University of Ilorin Teaching Hospital, Ilorin, Nigeria
8. Neurology, University College Hospital Ibadan, Ibadan, Nigeria
9. Radiology, University College Hospital Ibadan, Ibadan, Nigeria
10. School of Biomedical Engineering & Imaging Sciences, King's College London, London, United Kingdom
11. Great Ormond Street Institute of Child Health, London, United Kingdom
12. Great Ormond Street Hospital for Children, London, United Kingdom
13. Paediatrics, College of Medicine, University of Ibadan, Ibadan, Nigeria

Introduction: Low-field (LF, < 1T) Magnetic Resonance Imaging (MRI) is common in lower- and middle-income countries due to its easier and cheaper management. Images are often acquired at lower spatial resolution than at high field to partially overcome the inherently lower signal-to-noise ratio (SNR), which significantly limits the diagnostic power of LF-MRI.

Image Quality Transfer (IQT) is a machine learning framework to enhance the quality of images based on high-quality references. We have recently adapted it to improve the contrast and resolution of LF-MRI. Here we report the results of a preliminary radiological evaluation of the diagnostic quality of IQT-enhanced images in paediatric patients with epilepsy.

Methods: Twelve paediatric patients with intractable epilepsy (5 to 18 years old) had axial FLAIR, T1-weighted and T2-weighted MRI scans with an in-plane resolution of 0.5 mm and a slice thickness of 5 mm, both on a 0.36T MRI scanner and on a 1.5T scanner. The IQT model (Lin *et al.*, MICCAI 2019) was applied to the LF images to obtain IQT-enhanced images. The three sets of images (LF, HF and IQT-enhanced) were anonymised and randomly assigned to 6 reviewers, who evaluated the differentiation between normal-appearing grey and white matter (GM-WM) and lesion characterisation with scores from 1 to 4.

Results: IQT improved the contrast between healthy brain tissues and the appearance in non-axial planes of LF images. Most lesions also became more clearly visible in IQT-enhanced images compared to the raw LF images.

Reviewers scored both GM-WM differentiation and lesion characterisation in IQT-enhanced images as intermediate between LF and HF, except for GM-WM differentiation on FLAIR that was worse than at LF. Four of the reviewers, with experience in general radiology at LF, tended to give higher scores to LF images and lower scores to IQT-enhanced images than the other two reviewers, who have specialist expertise in paediatric neuroimaging at HF. **Conclusions:** Our IQT algorithm can improve the contrast between tissues and lesion visibility on LF-MRI. If these preliminary results are confirmed, IQT can be an important tool to help boost the diagnostic power of LF-MRI.

Is there a difference in subcortical volume in children with non-lesion and lesion epilepsy?

Zorica Joković¹, Aleksa Pejović², Vera Miler Jerković³, Marija Mijaljević⁴, Polina Pavićević¹, Aleksandar Ristić²

1. Department of Radiology, University Children's Hospital, Medical Faculty, Belgrade, Serbia

2. Epilepsy department, Clinic of Neurology, University Clinical Centre of Serbia, Medical Faculty, Belgrade, Serbia

3. Innovation Centre of the School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

4. Department of Radiology, Institute of Oncology and Radiology of Serbia, Medical Faculty, Belgrade, Serbia

*corresponding author dr.z.jokovic@gmail.com

Background: Many studies have found the difference in subcortical grey matter (GM) in patients with epilepsy, but there are a few studies that have compared subcortical GM between patients with temporal lobe epilepsy in children. We evaluated subcortical GM from patients with lesions and non-lesion magnetic resonance imaging (MRI). T1-weighted MR images of the human brain are used for segmentation. Our aims were to determine whether there are structural abnormalities in these patients and to correlate with the clinical characteristics of the disease.

Methods: High-resolution T1 weighted structural scans were acquired in the sagittal plane at 1.5 T (Philips Achieva, Amsterdam, Netherlands), and 1.5 T (Siemens, Avanto/Aera, Erlangen, Germany). Volumetric data for six subcortical GM structures (caudate nucleus, putamen, globus pallidus, nucleus accumbens, thalamus, and amygdala) were obtained using an atlas-based segmentation and registration tool. We used, an automated, model-based approach the FMRIB Integrated Registration and Segmentation Tool (FIRST), which is provided as a part of the FSL software library for calculating a raw volume of subcortical GM. Differences in the volumes between these two groups with epilepsy correlate with cognitive impairment.

Materials: The participants in our study include children with epilepsy; half were with non-lesion MRI and the other half with lesions. Twelve children with lesion epilepsy and 12

age-matched with non-lesion were imaged with high-resolution structural MR scans, from individuals aged 13–19 years. In the non-lesion MRI group were 4 boys (33.3%; mean age 15.2 ± 1.4), while in the group with lesion MRI were 5 boys (41.7%; mean age 16.1 ± 2.2). In the lesion MRI group, 7 have hippocampal sclerosis, 2 have dysembryoplastic neuroepithelial tumors, and one has focal cortical dysplasia.

Results: We found a statistically significant difference ($p < 0.004$, Mann-Whitney test) between non-lesion MRI epilepsy and lesion MRI at the right pallidum ($p = 0.009$; 1574.713 ± 189.699 vs. 1819.228 ± 228.227). There were no significant differences at the thalamus, nucleus caudate, putamen, amygdala, and accumbens area.

Conclusions: This study shows that there are differences in pallidum volume, which is the brain's main function mechanism of reward and motivation, and the results may explain low psychosocial outcomes. Subcortical GM atrophy is relevant to the early onset and progression of epilepsy.

Contributions of Adding a Routine Mastoid Fontanel Approach to Anterior Transfontanel Evaluation in the Newborn

Sevinç Taşar¹, Funda Yavanoğlu Atay

1. Ege University

Background: We aimed to share the results by adding mastoid fontanel kranial US (MF-CUS) method, which has so many benefits, to routine transfontanel examinations in our neonatal intensive care unit.

Material Methods: A total of 2400 newborn patients with a gestational age of 28–40 weeks who were hospitalized in the neonatal intensive care unit of our hospital between January 2020 and January 2023 were included in the study. In all patients, US was performed from the anterior fontanelle and the results were recorded. Then, sonographic evaluation of the mastoid fontanelle was performed blindly. Control MRI was performed in some patients. Thus, the contribution of the mastoid fontanelle to the diagnosis was evaluated.

Results: The posterior fossa cannot be evaluated adequately in the evaluations made only from the anterior fontanelle. Especially in term babies, probe insufficiency becomes more evident since the area to be examined is larger and fontanelle is narrower compared to premature babies. There were 48 patients who could not be detected only when viewed from the anterior fontanel and pathology was detected when the mastoid fontanel was added to the examination. Dilatation and hemorrhagic material in the lateral ventricular occipital horn in 15 of them, cerebellar hematoma in 13, isolated cerebellar vermis hypoplasia in 10, cerebellopontine hypoplasia in 3, transverse sinus thrombosis in 2, intraventricular hemorrhage in 2 of them, cerebellar hemispheric hypoplasia in 1, Dandy Walker malformation was detected in one of them and subdural collection in one of them.

Discussion: MF-CUS is an important window for the evaluation of the posterior fossa and partially occipital lobes and occipital horns of the lateral ventricle. It is useful in detecting congenital anomalies as well as acute findings such as bleeding, hematoma, sinus vein thrombosis, subdural collections. It is performed at the bedside and provides immediate diagnostic information. MRI provides diagnosis before imaging is possible. For an experienced sonographer requires only a few minutes of additional scanning time. However, MF-CUS also has its limitations. smaller lesions may be overlooked and false positive diagnoses may occur. Therefore, additional MRI is required in newborns with suspected PF abnormalities.

Conclusion: In all transfontanel examinations, in addition to the anterior fontanel, the mastoid fontanel should be routinely included in the examination.

Thursday 8th 9h-10:30h

Cardiothoracic and CT Session

Late chest wall sequelae after neonatal corrective surgery for esophageal atresia: a real-time MRI study

Gräfe, Daniel¹, Franz-Wolfgang Hirsch¹, Steffi Mayer², Martin Lacher², Ophelia Aubert²

1. Department of Pediatric Radiology, University Hospital, Leipzig, Germany

2. Department of Pediatric Surgery, University Hospital, Leipzig, Germany

Background: Musculoskeletal deformities and pulmonary morbidity are common in children after esophageal atresia (EA) repair. This study aims to assess morphological and functional postoperative changes after open or minimally invasive (MIS) approach compared to healthy controls by thoracic real-time MRI. This novel technique provides ultrafast, high-quality images during spontaneous breathing, without sedation even in young children.

Materials and Methods: Children aged 3-18 years were prospectively examined with real-time MRI at 3T. Musculoskeletal deformities, thoracic motility, and static thoracic cross-sectional areas (CSA) at three different levels, as well as dynamic right-to-left ratio of CSA of hemithoraces during deep breathing were evaluated.

Results: 72 children (41 open, 8 MIS, 23 controls) were recruited. Mean age at examination was lower in MIS (6.8±2.8) than open (10.4±4.0) and control (10.8±3.5) patients (p<0.05). In the EA group, rib fusions (76%) and scoliosis (15%) were found after thoracotomy, but not after MIS. Mean right-to-left ratio of CSA were lower after thoracotomy compared to MIS and controls (p<0.05), indicating decreased thoracic motility and impaired thorax development. This was significantly aggravated by an

increasing number of thoracotomies. Mean right-to-left ratio of CSA in MIS patients did not differ from controls.

Conclusions: For the first time, morphological changes and thoracic motility after EA repair were visualized by dynamic real-time MRI. Children after open repair showed more musculoskeletal deformities, decreased right-sided thoracic motility and development compared to MIS and controls. Our study emphasizes that the musculoskeletal morbidity following a thoracotomy in infancy is high.

The usefulness of lung ultrasound in newborns and infants with respiratory pathologies

Stoicescu Emil Robert¹, Iacob Roxana¹, Cerbu Simona¹, Manolescu Diana¹, Birsasteanu Florin¹

1. Department of Radiology and Medical Imaging, 'Victor Babes' University of Medicine and Pharmacy Timisoara, Eftimie Murgu Square No. 2, 300041 Timisoara, Romania, Research Center for Pharmaco-Toxicological Evaluations, 'Victor Babes' University of Medicine and Pharmacy Timisoara, Eftimie Murgu Square No. 2, 300041 Timisoara, Romania

Background: Today, lung ultrasound is a useful tool used as a non-invasive, radiation-free method to investigate respiratory pathologies, particularly in newborns and children.

Purpose: This study aims to demonstrate this method's effectiveness in managing respiratory diseases of neonates and infants, avoiding cumulative doses of radiation.

Material and Methods: The study included 42 newborns and infants with respiratory diseases, 31 of whom were infected with SARS-CoV2. The ultrasound machines used for the assessment were equipped with both the linear transducer and the micro convex one. For all neonates and infants, lung severity was assessed with an ultrasound score covering twelve chest areas of interest – Lung UltraSound Score (LUSS).

Results: The most common ultrasound changes indicate the disappearance of the physiological A-lines in 90.47% of cases, sparse B-lines in 61.90%, and coalescent B lines with a prevalence of 38.09%. The abnormalities of the pleural lines (thickening, fragmentation, irregularity) were found in 59.52%, and subpleural consolidations at 28.57%. The correlation between LUSS and the patient's symptoms and biomarkers was conducted with the Pearson correlation coefficient, showing $r = 0.814$ ($p = 0.03$) between the LUSS and IL-6 levels at symptomatic neonates and infants (with fever and cough).

Conclusions: The changes revealed by the lung ultrasound and assigned LUSS show a mild form of respiratory pathology in neonates and infants. Thoracic ultrasound may be used in the follow-up of patients with respiratory pathology, assisting in the management of pulmonary pathologies of newborns, based on LUSS.

References:

1. Stoicescu, E.R.; Lovrenski, J.; Iacob, R.; Cerbu, S.; Iacob, D.; Iacob, E.R.; Susa, S.R.; Ciuca, I.M.; Ciornei-Hoffman, A.; Oancea, C.; Manolescu, D.L. COVID-19 in Infants and Children under 2 years – Lung Ultrasound Score Correlated with Biomarkers and Symptoms. Preprints 2022, 2022120036 (doi: 10.20944/preprints202212.0036.v1).
2. Stoicescu, E.R.; Ciuca, I.M.; Iacob, R.; Iacob, E.R.; Marc, M.S.; Birsasteanu, F.; Manolescu, D.L.; Iacob, D. Is Lung Ultrasound Helpful in COVID-19 Neonates?—A Systematic Review. *Diagnostics* 2021, 11, 2296. <https://doi.org/10.3390/diagnostics11122296>
3. Stoicescu, E.R.; Manolescu, D.L.; Iacob, R.; Cerbu, S.; Dima, M.; Iacob, E.R.; Ciuca, I.M.; Oancea, C.; Iacob, D. The Assessment of COVID-19 Pneumonia in Neonates: Observed by Lung Ultrasound Technique and Correlated with Biomarkers and Symptoms. *J. Clin. Med.* 2022, 11, 3555. <https://doi.org/10.3390/jcm11123555>
Stoicescu.emil@umft.ro

Dual Phase CTA evaluation of the Pulmonary Veins with Dual Energy and High-pitch ECG-Gated CTA

Jordan B. Rapp¹, Hansel J. Otero¹, Karen I. Ramirez¹, Ammie M. White¹, Mariangeles Medina Perez¹, Michael L. O'Byrne¹, Ryan Callahan¹, Jonathan J. Rome¹, David M. Biko¹

1. Children's Hospital of Philadelphia

Background: Imaging plays an ever-increasing role in the evaluation of the pulmonary veins (PV). PV stenosis results from a variety of causes such as congenital heart disease (CHD) or chronic lung disease (CLD). We aim to demonstrate that dual-energy CT (DECT) can identify significant perfusion abnormalities related to PV stenosis.

Material and Methods: CTA of the chest of the PV was performed using a dual-phase technique. First, CTA using DECT with 2mg/kg of IV contrast timed for optimal evaluation of the pulmonary arteries was performed. Iodine concentration was measured in each lobe. Subsequently, high-pitch ECG-gated CTA using 1mg/kg of IV contrast timed for optimal visualizing of the PVs. Each of the four PVs were measured, when applicable. Presence of stenosis and decreased perfusion was compared between CTA phases and with cardiac catheterization. Patients with prior PV interventions and cavopulmonary connections were excluded.

Results: 20 patients (9 male) with a median age of 6 months (2 weeks to 11 years) were included. In terms of diagnosis, 30% had TAPVR, 55% had CLD, and 15% had other diagnoses. Eight (40%) had cardiac catheterization for PV evaluation. 11 (55%) patients had normal CT anatomic and perfusion evaluations. Six (30%) patients had concordant anatomic stenosis (11 veins) and perfusion abnormalities (18 lobes), all confirmed with catheterization.

Discordance occurred in three cases, all with CLD. In one patient normal perfusion (3 lobes) underestimated PV stenosis (2 veins) on the anatomic scan. In one patient diminished perfusion (1) was seen without anatomic stenosis (1). One patient had a mixture of diminished perfusion (2) with corresponding anatomic stenosis (1) and diminished perfusion (3) with normal veins (2). In the two patients with catheterization, it matched the anatomic scan. **Conclusion:** In our study there was concordance between CT anatomic evaluation of the pulmonary veins and cardiac catheterization. Most cases also demonstrated concordance with DECT perfusion maps. Abnormalities related to lung parenchyma in patients with moderate to severe CLD were a cause of non-concordance and must be considered when interpreting perfusion maps when evaluating for PV stenosis.

Phase resolved functional lung (PREFUL) MRI detects improvement of perfusion and ventilation after Elexacaftor/Tezacaftor/Ivacaftor therapy in patients with Cystic Fibrosis

Martha Dohna¹, Andreas Voskrebenezv^{1,2}, Filip Klimes^{1,2}, Till F. Kaireit^{1,2}, Julian Glandorf^{1,2}, Sophia T. Pallenberg^{2,3}, Felix C. Ringshausen^{2,4,5}, Gesine Hansen^{2,3}, Diane Miriam Renz¹, Frank Wacker^{1,2}, Anna-Maria Dittrich^{2,3}, Jens Vogel-Claussen^{1,2,3}

1. Department of diagnostic and interventional Radiology, Hannover Medical School, Hannover, Germany

2. German Center for Lung Research (DZL), Biomedical Research in Endstage and Obstructive Lung Disease (BREATH), Hannover Medical School, Hannover, Germany

3. Department for Pediatric Pneumology, Allergology and Neonatology, Hannover Medical School, Hannover, Germany

4. Department of Respiratory Medicine, Hannover Medical School, Hannover, Germany

5. European Reference Network on Rare and Complex Respiratory Diseases (ERN-LUNG), Frankfurt, Germany

Background: There is a need for regional monitoring of treatment effects of elexacaftor/tezacaftor/ivacaftor (ETI) in people with cystic fibrosis (pwCF).

Purpose: To investigate if phase-resolved functional (PREFUL) magnetic resonance imaging (MRI) derived quantitative ventilation and perfusion measures can assess changes in pwCF after initiation of ETI therapy and how these measures relate to established clinical and MRI-derived parameters.

Materials and methods: Participants with CF aged ≥ 12 years underwent PREFUL MRI, spirometry, sweat chloride test, anthropometry and lung clearance index (LCI) assessment before and 8-16 weeks after ETI. 2D dynamic coronal gradient echo images covering the entire lung were acquired. For PREFUL derived ventilation and perfusion parameter

extraction MR images were evaluated by an automated quantitative pipeline. In addition, the semiquantitative Eichinger score was derived by radiologist read using T1 and T2 weighted MR images as well as PREFUL perfusion maps. **Results:** 23 participants (13 female, median age 18 years (IQR, 14–24.5) received MRI assessment before and after initiation of ETI. Quantitative PREFUL parameters of ventilation and perfusion, visually assessed Eichinger score and clinical parameters showed significant improvement after treatment with ETI. Ventilation defect percentage of regional ventilation decreased from 18% (IQR, 14–25) to 9% (IQR, 6–17) ($P=0.003$), and perfusion defect percentage from 26% (IQR, 18–36) to 19% (IQR, 13–24) ($P=0.002$). Areas of matching normal (healthy) ventilation and normal perfusion increased from 52% (IQR, 47–68) to 73% (IQR, 61–83). Absolute change of post-treatment flow volume loop (FVL_{CM}) correlated with LCI changes ($P=0.032$). Visually assessed perfusion score did not correlate with PREFUL perfusion ($P=0.11$) nor with ventilation/perfusion match values ($P=0.375$). **Conclusion:** Automated quantitative PREFUL MRI supports previous data showing structural improvements in MRI in pwCF in response to ETI. Furthermore, our data provide evidence, that this novel technique also identifies perfusion and ventilation changes in response to CFTR modulator therapy with elexacaftor/tezacaftor/ivacaftor.

UTE/ZTE lung-MRI in the diagnosis of tracheobronchial stenosis in children

N. Kocher¹, W. Jungraithmayr^{2,3}, M. Zellner¹, T. Schürmann⁴, A. Möller⁴, C. Kellenberger¹

1. University Children's Hospital Zurich - Eleonore Foundation, Department of Diagnostic Imaging, Zurich, Switzerland

2. Department of Thoracic Surgery, University Hospital Zurich, Zurich, Switzerland

3. Department of Thoracic Surgery, Medical Center – University of Freiburg, Faculty of Medicine, University of Freiburg, Germany

3 University Children's Hospital Zurich - Eleonore Foundation, Department of Pulmonology, Zurich, Switzerland

Purpose: Tracheobronchial stenosis in pediatric patients is diagnosed by bronchoscopy in combination with CT. Visualization of the tracheobronchial system with traditional MRI sequences is only possible to a limited extent. By using novel MRI sequences with very low echo times, airfilled structures can be imaged sufficiently. The aim of this study was to evaluate the diagnostic performance and reproducibility of ultrashort (UTE) and zero echo time (ZTE) sequences in children with tracheobronchial stenosis.

Methods: Lung-MRI studies performed between 10/2018 and 03/2023 at a 1.5T GE Signa Scanner in a single-center were retrospectively evaluated. UTE/ZTE sequences of patients with stenosis of the tracheobronchial system, confirmed by bronchoscopy, and healthy controls were assessed for their diagnostic accuracy. Furthermore, diameters of airways were measured independently by two radiologists on multiplanar reconstructions at the level of the stenosis, in the proximal trachea and in the right and left main bronchus. For five patients in the diseased group and for eight patients in the healthy control group, quantified diameters of the MRI data were compared to those of the CT data.

Materials: 23 patients with a mean age of 27.8 months (0–13 years) with a stenosis of the tracheobronchial system were included in the study. Five of these 23 patients also underwent a CT scan within five months prior to or after the MRI. Eight patients with a mean age of 63.8 months (0–13 years) without any stenosis of the tracheobronchial system that underwent an MRI as well as a CT scan within a time interval of 7 months, due to other thoracic pathologies, served as healthy controls.

Results: The two independent radiologists diagnosed the diseased group in both imaging modalities correctly. The differences of the measured diameters, plotted in a Bland-Altman diagram, scattered around zero, thus no consistent bias of MRI and CT can be suggested. A high inter-rater reliability was seen.

Conclusions: UTE and ZTE imaging of the tracheobronchial system represents a novel radiation-free method with a high diagnostic performance and reproducibility, which has the potential to replace CT scans in the pediatric population.

CT-Based Predictive Model for Myocardial Ischemia in Anomalous Aortic Origin of Coronary Artery

Rajesh Krishnamurthy¹, Silvana Molossi², Carlos Mery², Jayanthi Parthasarathy¹, Michael Jiang⁴, Tara Karamlou⁴, Lakshmi Prasad Dasi⁵

1. Nationwide Children's Hospital, The Ohio State University, Columbus, Ohio, USA

2. Texas Children's Hospital, Houston, Texas, USA

3. UT-Dell Children's Hospital, Austin, Texas, USA

4. Cleveland Clinic, Cleveland, Ohio, USA

5. Georgia Institute of Technology, Atlanta, Georgia, USA

Purpose: The cause of sudden cardiac death (SCD) in anomalous aortic origin of the coronary artery (AAOCA) has a biomechanical basis related to specific morphological features detectable by CT, including dynamic ostial stenosis and narrowing of the intramural and inter-arterial segments of the proximal coronary artery during exercise. However,

decision making for optimum management is limited by lack of a predictive model that determines risk for SCD. We present a novel reduced-order model that utilizes CT biomarkers as input; stress induced Instantaneous wave-free ratio (iFR) changes as output; and solves for dynamic pressure changes from the ostium through distal coronary artery, including dynamics of intima wall motion of the intramural segment.

Materials and Methods: This is an IRB approved feasibility study that collected cath-derived iFR at rest and after Dobutamine stress from 8 pediatric and adult patients with AAOCA (age range 11-63). Morphological characteristics of the proximal anomalous coronaries, such as ostial and proximal coronary caliber, intramural length, and intima wall thickness were extracted from CT. A Frank-Starling driven reduced order model that solves a zero-dimensional representation of the fluid-structure interaction of the intramural wall and the coronary artery coupled with blood flow was developed, and baseline state (determined by the fluid parameters of the model) tuned for each patient's corresponding resting Cath iFR. The model simulated and predicted iFR changes corresponding to Dobutamine stress by tuning material properties of the intima wall. Comparison of % predicted to measured iFR drop between rest and exercise was made in 6 patients.

Results: AAOCA predictive model was successfully tuned to patient-specific physiological flow conditions. Resting cath iFR range was 0.81 to 0.98 while stress iFR range was 0.72 to 0.95. Simulated iFR with stress was 0.7 to 0.94. Model demonstrated good agreement with predicted iFR drop with stress falling within 14% error of the measured cath-iFR drop.

Conclusion: Novel predictive model of ischemia in AAOCA using CT based morphologic imaging biomarkers in a patient-specific reduced-order approach captures dynamic changes in coronary pressure and iFR with stress. The next steps are further refinement of the model, and application in a validation study to distinguish AAOCA subjects with and without ischemia.

CONSERVATIVE VS. SURGICAL TREATMENT OF PARAPNEUMONIC EFFUSIONS IN CHILDREN - WHERE ARE THE ULTRASONOGRAPHIC BOUNDARIES?

Svetlana Balj Barbir¹, Dragana Simić¹, Jelenković Aleksandar¹, Jecković Mihajlo¹, Gordana Vilotijević-Dautović^{1,2}, Snježana Ilić¹, Radoica Jokić^{1,2}, Jelena Antić^{1,2}, Bojana Andrejić-Višnjić², Jovan Lovrenski^{1,2}

1. Institute for Children and Adolescents Health Care of Vojvodina, Novi Sad, Serbia
2. Faculty of Medicine, University of Novi Sad, Serbia

Background: Incidence of parapneumonic effusion, the most common complication of pneumonia in children, has increased worldwide. Its treatment is controversial without a

clear boundary between conservative and invasive approach.

Methods: A retrospective study of paediatric patients with parapneumonic effusion admitted at the University children's hospital within a 3-year period (2020-2022) was conducted. Groups of patients treated conservatively (antibiotics only) and surgically were compared, as well as subgroups of patients with simplex (anechoic) and complex effusions (echogenic or with fibrinous strands, septations, loculations).

Materials: Hospital databases were reviewed to determine treatment, laboratory, radiological investigations and hospital days. Ultrasonography (US) effusion thickness (maximum perpendicular interpleural distance between consolidated lung and the chest wall) was analyzed.

Results: A total of 47 children aged 1-17 years (4.9 ± 3.8 y) were enrolled in the study, 29 treated conservatively and 18 surgically (intercostal drainage in 13, 1 thoracentesis, 4 video-assisted thoracoscopic surgeries). Effusion thickness in surgical group was significantly higher ($p < 0.001$) compared to conservative group (mean 36.33 ± 18.65 mm vs. 12.90 ± 8.21 mm), with effusion thickness ≥ 20 mm in 94.4% of patients. In conservative group effusions were < 25 mm in 89.6% of patients. Total of 21 children had simple and 26 complex effusions. Patients with simple effusions did not require surgery, had significantly smaller effusion thickness (10.17 ± 6.17 mm vs. 31.33 ± 17.88 mm) and shorter hospital stay (15.2 vs. 29.8 days) compared to complex effusion subgroup. Patients with complex effusions had similar length of hospitalization regardless of treatment method. Surgically treated children all had complex effusions, significantly higher white blood counts and C-reactive protein values ($p < 0.001$), and significantly longer hospital stay compared to conservative group (29.7 days (17-44) vs. 19.3 (5-46)). US effusion complexity ($p < 0.001$) and thickness ($p < 0.01$) were the strongest determining parameters.

Conclusions: US findings of complex parapneumonic effusions with a thickness over 20mm are strongly related with severity of the disease, therapeutic decisions and length of hospitalization. In our study effusion thickness of 20-25mm and 25-30mm were proved as borderline and highly indicative for surgical treatment respectively.

Congenital Variants and Anomalies of the Aortic Arch – single centre study

Vesna Topic¹, M. Stajević^{2,3}, V. Vukomanović^{2,4}, A. Gazikalović⁵, S. Milinković¹, J. Tončević¹, D. Perković¹, N. Zlatar¹, S. Prijic^{2,4}, I. Dizdarević³, S. Gazikalović¹

1. Department of Radiology, Institute for Mother and Child Health Care of Serbia "Dr Vukan Cupic", Belgrade, Serbia
2. Medical School, University of Belgrade, Belgrade, Serbia
3. Department of Pediatric Cardiothoracic Surgery, Institute for Mother and Child Health care of Serbia "Dr Vukan Cupic", Belgrade, Serbia

4. Department of Cardiology, Institute for Mother and Child Health care of Serbia "Dr Vukan Cupic", Belgrade, Serbia
5. Department of Radiology, Ljubljana University Medical Centre, Slovenia

Objective: Congenital aortic arch malformations present a large spectrum of variations and anomalies, as a result of disordered embryogenesis of branchial arches.

Some of these variants are asymptomatic and frequently reported as incidental findings on imaging studies. However, these anomalies can be associated with different symptoms, such as dysphagia, stridor and respiratory distress, as a result of vascular rings that lead to compression of the trachea or oesophagus, or both. Some types of these malformations are strongly associated with other congenital heart disease (CHD) and chromosomal abnormalities.

The development of multidetector computed tomography (MDCT) has triggered a revolution in the study of the aorta and other large vessels and has replaced conventional angiography in the diagnosis of congenital anomalies of the aortic arch, particularly vascular rings.

Methods: We analysed 149 CT angiographies (139 patients) which were performed from January 2019 till November 2022 in Institute for Mother and Child Healthcare of Serbia "dr Vukan Cupic", on 16 MDCT either in preoperative or postoperative phase, according to indications.

Results: Of 139 patients, 85 (61,1%) were males, 54 (38,9%) females, age between 1 day and 16 years (median age 9 months). Majority had left aortic arch with usual branching (82 patients - 59%), 15 patients (10,8%) had Bovin type of aortic arch and 11 patients (8,9%) had aortic arch with four branches (left vertebral artery origin from the aortic arch). Right-sided aortic arch with mirror image branching was noticed in 17 patients (12,2%) with associated CHD (tetralogy of Fallot, truncus arteriosus). Left and right aortic arch with aberrant subclavian artery was present in 8, double aortic arch in 4 and interrupted arch in 2 patients. Hypoplastic aortic arch, aortic coarctation and pseudocoarctation were noticed in 13 patients with left sided aortic arch.

Conclusion: MDCT angiography is a reliable imaging technique allowing for complete evaluation of the aortic arch and branch vessels as well as their relations to surrounding structures, most importantly in preoperative surgical planning. In addition, CT angiography provides important information in postoperative evaluation and monitoring patients with CHD.

Dynamic Contrast Magnetic Resonance Lymphangiography (DCMRL) in Neonates and Children: categorizing imaging findings to predict outcome and to guide therapy

Ralph Gnannt¹, Oliver Kretschmar², Eva Kühlwein³, Ueli Moehrlen⁴, Hitendu Dave⁵, Christian Kellenberger¹

1. Diagnostic and Interventional Radiology, Children's Hospital Zurich

2. Cardiology, Children's Hospital Zurich
3. Intensive Care Unit, Children's Hospital Zurich
4. Paediatric Surgery, Children's Hospital Zurich
5. Cardiac Surgery, Children's Hospital Zurich

Introduction: To describe the technique and report our initial experience with the use of Dynamic intranodal contrast-enhanced magnetic resonance lymphangiography (DCMRL) in children.

Material & Methods: Retrospective review of all patients between 0 and 18 years of age who underwent a DCMRL at our institution between January 2018 and December 2022. Needle placement into lymph nodes in each groin was performed by ultrasound guidance under general anesthesia. Gadolinium contrast was injected to acquire dynamic imaging. Technical success was defined as contrast enhancement of the thoracic duct. Patients were categorized into Pulmonary Lymphatic Perfusion Syndrome (PLPS), Central Lymphatic Flow Disorder (CLFD), and surgical leaks. Clinical outcome and therapy options were noted.

Results: 20 patients (7 females) were included in the analysis. Mean age at date of scan was 2yrs and 1 month (range 11d – 9yrs). Indication for DCMRL was congenital chylothorax (n=6), post-cardiac surgery chylothorax (n=12), and plastic bronchitis (n=2). 6 patients showed a lymphatic flow pattern of a PLPS, 7 patients of a CLFD, one patient a surgical complication, and 5 showed a normal flow pattern with anatomical variants. In one patient, the thoracic duct remained unenhanced (95% technical success rate). Additional Lipiodol embolization to close lymphatic leakage was used in 2 patients.

All 6 patients with a PLPS survived, 2 out of 6 with Lipiodol embolization. On the other hand 4 out of 7 patients with a CLFD died, two of them despite surgical pleurodesis. Mean follow-up was 1 year and 8 months (range 4 months – 5 years).

Conclusion: DCMRL has evolved as a useful diagnostic tool for neonatal or post-operative high output chylothoraxes. It may guide therapeutic decisions including Lipiodol based closure of lymphatic leakage as well to predict outcome.

Thursday 8th 13.30h-15h

Oncology and Interventional Radiology Session

Imaging of pediatric mandibular tumors

Birgit Spors¹

1. Helios Klinikum Berlin- Buch, Berlin, Germany

Purpose: Mandibular tumors are rare in children and represent a heterogeneous group.

Compared to adults pediatric mandibular tumors showed considerable differences.

Methods/Material: All children with solid mandibular tumors except odontogenic lesions are included between 2017 and 2022.

Available imaging tools: X ray, ultrasound, CT and MRI scans are reviewed

Pathological diagnosis, treatment and recurrences of the tumor are analyzed.

Results: Five patients, were included, with the mean age of the patient being 12 years old (range 7 years to 18 years). 2 benign and 3 malignant tumors with different pathological entities were identified. Different imaging modalities determines special characteristics of tumor entities.

Conclusion: Radiological signs of the aggressiveness of the tumor do not correlate with malignancy of the tumor. All image modalities together are necessary to find a diagnosis.

In addition to local imaging, whole body MRI can be helpful to confirm assumed diagnosis.

Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age

Gozde Ozer¹, H. Nursun Ozcan¹, Burak Ardıçlı², Tezer Kutluk³, Berna Oguz¹, Mithat Halilolu¹

1. Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Turkey

2. Department of Pediatric Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey 3. Department of Pediatric Oncology, Hacettepe University Faculty of Medicine, Ankara, Turkey

Background: Hepatoblastoma (HB) accounts for two-thirds of primary malignant liver tumors in children and mostly occur under the age of five. Hepatocellular carcinoma (HCC) is the second most common primary malignant liver tumor, often seen after the age of ten. Although some characteristic imaging findings have been described in both HB and HCC, it is difficult to distinguish between these two tumors when a patient is over the age of five.

Materials and methods: The radiology archives were searched to assess HB and HCC patients older than 5-year-old between 2007-2022. Initial MRIs and/or CTs of all patients were evaluated for the presence of background liver disease, signal characteristics of lesions, contrast enhancement pattern, presence of necrosis, central scar, tumor capsule, and portal/hepatic venous involvement. Maximum transverse diameter, PRETEXT stages and annotation factors were noted. In addition to imaging findings, initial symptoms, age at diagnosis, serum alpha-fetoprotein (sAFP) levels, histopathological results, and follow-up data were reviewed.

Results: A total of 19 children (16 boys, 3 girls, mean age=10) were included. There was no significant difference between HB (n=9) and HCC (n=10) groups in terms of age and gender. PRETEXT stage III and IV were more

common in HB-group (n=2 and n=6, respectively), and stage I and II were more common in HCC-group (n=3 and n=4, respectively); albeit this failed to reach statistical significance (p=0.053). sAFP values were significantly higher in the HB-group (sAFP-mean=235068 ng/ml) compared to the HCC-group (sAFP-mean=34009 ng/ml) (p=0.002). Tumor size was found higher in the HB-group (mean=133 mm) than the HCC-group (mean=87 mm); however, there was no statistically difference (p=0.06). Also, there was no difference between two groups in presence of necrosis, central scar, and tumor capsule. Initial MRI was available for 6 patients with HB and 7 patients with HCC, and there was no difference regarding ADC-values (HB-group-mean=0.8x10⁻³ mm²/s; HCC-group-mean=1x10⁻³ mm²/s, p=0.13).

Conclusions: In this study, PRETEXT stage and sAFP values were found higher in the HB-group. Although it is difficult to distinguish between HB and HCC with clinical features and imaging findings in patients over 5 years of age, these findings may help in differential diagnosis.

Super-selective embolisation for traumatic non-ischaemic priapism; a case series

Bevan, J¹, Parthipun, A¹, Jenkins, R¹, Laidlow-Singh, H.,² Lloyd C¹

1. Evelina London Children's Hospital

2. The Royal London Hospital

Purpose / Objectives / Background: Both ischaemic and non-ischaemic priapism are time-sensitive diagnoses requiring prompt treatment to avoid long-term sexual dysfunction. Non-ischaemic priapism typically occurs secondary to blunt perineal trauma. At our centres we have performed super-selective embolisation for this condition with satisfactory results, the aim being to obviate the need for surgical management. This case series describes the clinical features and imaging appearances of post-traumatic high-flow priapism and the resultant embolisation technique with clinical outcomes.

Methods and materials: Three cases were selected following review of previous studies at two tertiary paediatric centres. All children (aged 8-10 years) were diagnosed with non-ischaemic priapism with supportive imaging features of a high-flow lesion. Selective embolisation was performed in all cases.

Results: In all three cases there was a preceding traumatic event (straddle injury).

All patients presented with painless priapism that failed to resolve with conservative management. In all three cases, penile ultrasound revealed a high-flow lesion (arteriovenous fistula or pseudoaneurysm). In one case there was diagnostic uncertainty following ultrasound and subsequent aspiration and washout of the corpus cavernosa was performed. In the same case due to negative surgical findings a CT angiogram

was performed which demonstrated a high-flow lesion (arteriovenous fistula).

All three children subsequently underwent digital selective angiography confirming a high-flow lesion with embolisation of the affected vessel.

Following the procedure, all three patients showed good clinical outcomes with resolution of priapism and no further adverse events.

Conclusion: Recognition of non-ischæmic priapism due to a high-flow lesion following trauma is important so that timely treatment can be commenced. Super-selective embolisation is a minimally invasive and accurate treatment method for such lesions. We hope that this case series serves to give confidence to clinicians in their diagnosis and highlights the importance of the involvement of Interventional Radiologists in the management of such patients.

Direct correlation of MRI-DWI and histopathology of pediatric renal tumors through a patient-specific 3D-printed cutting guide: a single-center prospective study

Justine N. van der Beek^{1,2}, Matthijs F. Fitski¹, Ronald R. de Krijger^{1,3}, Marijn A. Vermeulen^{1,3}, Peter G.J. Nikkels³, Arie Maat¹, Marc H.W.A. Wijnen¹, Marry M. van den Heuvel-Eibrink¹, Alida F.W. van der Steeg¹, Annemieke S. Littoojij^{1,2}

1. Princess Máxima Center for Pediatric Oncology, Utrecht, The Netherlands

2. Department of Radiology and Nuclear Medicine, University Medical Center Utrecht/Wilhelmina Children's Hospital, Utrecht, The Netherlands

3. Department of Pathology, University Medical Center Utrecht, Utrecht, The Netherlands

Purpose: Invasive procedures to determine histology of pediatric renal tumors before start of therapy are discouraged within the SIOP-Renal Tumor Study Group (SIOP-RTSG). In rare non-Wilms tumors (non-WTs) this may initiate misdiagnosis-based pre-operative chemotherapy. Furthermore, the more frequently occurring WTs often comprise of heterogeneous lesions with distinct pathology. Risk assessment in WTs is based on post-surgical histological subtype, indicating clinical differences. MRI and DWI show potential value as non-invasive biomarker through tumor characteristics and apparent diffusion coefficients (ADCs). This study aims to prospectively analyze MRI-characteristics of histological subtypes of WTs as well as non-WTs, with the purpose to non-invasively discriminate different pediatric renal tumor types based on MRI-DWI.

Materials & Methods: Pediatric renal tumor patients were included based on MRI following standard of care, and treated following the SIOP-RTSG 2016 UMBRELLA protocol. In case of a total nephrectomy, a patient-specific cutting guide based on the pre-operative MRI was 3D-printed, allowing direct comparison of imaging and histopathology

based on correlated slices. In case of non-eligibility for a cutting guide, only whole-tumor ADC-values were measured. ADC-values of different diagnoses together with patient- and solid tumor characteristics are statistically analyzed with correlation coefficients and the Mann-Whitney U-test.

Results: So far, 44 patients (47 lesions) with a median age of 2.6 years (range 1-177 months) were included. Thirty-seven lesions were diagnosed as WTs, of which 12/37 were regressive tumors. WTs appeared T2-hyperintense, T1-hypointense and predominantly heterogeneous. Median tumor volume of WTs at diagnosis was 589.7 cm³ (range 3.3-1956.9 cm³), with limited median decrease or even increase (48.1 cm³, range -332.7-561.5 cm³) after pre-operative chemotherapy in stromal type WTs. On whole-tumor level, the median- and 25th percentile ADC after pre-operative chemotherapy of stromal type WTs (7/37, mean 25th percentile ADC 1.212x10⁻³ mm²/s) were significantly different (p=0.017) from epithelial and blastemal WT-lesions.

Conclusions: This ongoing prospective study shows stromal type WTs could be discriminated from more aggressive WT subtypes, showing significantly higher median ADC-values and limited decrease in volume after pre-operative chemotherapy. These findings could be relevant for future decision-making in pediatric renal tumors, especially concerning high-risk tumors, bilateral tumor cases and potential nephron sparing surgery.

Diffuse midline Glioma different locations and tips differential diagnosis

Marta Gómez-Chiari¹, Jordi Muchart¹, Mariana Planells¹, Jarek Smiechowicz¹, Emili Inarejos¹, Andres Morales La Madrid²

1. Pediatric Radiologist Barcelona Children's Hospital Sant Joan de Déu

2. Pediatric Oncologist Barcelona Children's Hospital Sant Joan de Déu

Purpose/Objective/Background: Diffuse midline glioma (DMG) is a heterogeneous group of aggressive pediatric brain tumors with a fatal prognosis. DMG have specific molecular features (H3M and EGFR mutation). Prognosis remains poor, with median survival ranging from 9 to 12 months from diagnosis. Clinical and radiological prognostic factors only partially change the progression-free survival but they do not improve the overall survival.

MRI is a power tools for the diagnosis of DMG, in particular, for Diffuse intrinsic pontine glioma (DIPG), typical findings include a T1-hypointense and T2-hyperintense lesion involving >50% of the pons with patched areas of high perfusion and restricted diffusion. But in others locations the findings could be are unspecific.

Methods: We retrospectively reviewed the MR findings on patients with DMG from January 2017 to January 2023 at a reference Pediatric Hospital.

Material: We review findings on MRI different sequences, trying to describe specific patterns on brain and spine DMG, to search for radiological predictors of H3K27M mutation subtype (H3.3 worse survival than H 3.1), EGFR mutation, and predictors of median survival (morphological sequences, advanced techniques, radiomics). **Results:** A total of 38 patients with DMG were included, 18 girls and 20 boys, aged from 4 to 18 years. There were 4 spinal cord tumor, 5 thalamic tumor and 29 pontine tumor. We have evaluated different variables as these: location (central / eccentric), T2 hypersignal with swollen appearance, ADC value (focal restriction), contrast enhancement types and perfusion sequences (vascularization / hyperperfusion), necrosis, bleeding and leptomeningeal extension (craniospinal study). **Conclusion:** Location and MRI characteristics (thalamus-EGFR mutation, DIPG phenotype) are highly suspected of DMG. ADC value, ring contrast uptake, tumor extension towards median peduncle or to the midbrain and medullary bulb, quantitative studies measuring tumor volume, CBC, permeability and values of tumor metabolites could be predictive biomarker for H3 K27M mutation status and survival.

RM evaluates deep location of tumors, this limits surgical resection or biopsy. Tumors with unusual presentation and within clinical trials must be biopsied. The diagnosis in the vast majority is clinical-radiological, the role of the radiologist is fundamental (multidisciplinary team - tumor committee).

Retrospective series of renal biopsies in pediatric patients from 2016 to 2022: analysis of complications and outcomes using a standardized protocol

Marta Gonzalo-Carballés¹, Alejandro Cruz-Gual¹, Lluís Riera-Soler¹, Ana Coma-Muñoz¹, Lucía Rianza-Martin¹, Maria Ibnoukhatib¹, Élica Vázquez-Méndez¹

1. Hospital Universitari Vall d'Hebron, Barcelona, Spain

Background: Renal biopsy is a valuable tool for diagnosing and managing renal diseases in pediatric patients. However, it carries a risk of hemorrhagic complications, especially in children, requiring additional diagnostic procedures, blood transfusion, vascular intervention and prolongation of hospitalization.

Objectives: The aim of this study was to evaluate the safety and efficacy of a standardized protocol for performing renal biopsies in pediatric patients, as well as to analyze the incidence of complications and outcomes.

Methods: We performed a single center retrospective analysis of all renal biopsies performed in pediatric patients from 2016 to 2022 at our Pediatric Institution. All biopsies were performed under ultrasound guidance by an experienced radiologist, under moderate sedation by pediatric anesthesiologist and with sample quality examination in the operating room by a nephrologist. We used 18-gauge biopsy needles.

All patients underwent analytical and ultrasound monitoring 24 hours after the biopsy, regardless of their clinical stability.

Results: A total of 199 renal biopsies were performed, with 41.7% from kidney transplants and 58.3% from native kidneys. In 97.5% of the samples, sufficient glomeruli were obtained for diagnostic purposes. The incidence of severe complications that required major therapy (interventional radiology embolization or blood transfusion), increased level of care and prolonged hospitalisation (>48h) was only 4% (SIR D), and included progressive perirenal hematoma with active bleeding, arteriovenous fistula with clinical compromise and pseudoaneurysm. No patient presented permanent adverse sequelae (SIR E) or required nephrectomy or died due to biopsy-related complications (SIR F). The protocol for 24-hour analytical and ultrasound monitoring identified mild complications (SIR A-B) consisting of perirenal hematoma (31%) and small arteriovenous fistulas (9.5%) that resolved spontaneously without clinical or hemodynamic repercussions.

Conclusion: Our standardized protocol for performing renal biopsies in pediatric patients under ultrasound guidance, moderate-sedation by pediatric anesthesiologist, sample quality examination in the operating room by a nephrologist is a safe and effective method with low incidence of severe complications. The use of 24-hour analytical and ultrasound monitoring can help identify mild complications and prevent serious adverse events.

Feasibility and diagnostic accuracy of early postoperative MRI after resection of neuroblastic tumors

Maryanna Chaika¹, Michael Esser¹, Patrick Krumm¹, Riccardo Guglielmi¹, Joerg Fuchs², Steven Warmann², Christian Urla², Juergen Schaefer¹

1. Department of Diagnostic and Interventional Radiology, University Hospital Tuebingen, Hoppe-Seyler-Strasse 3, 72076, Tuebingen, Germany

2. Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital Tuebingen, Tuebingen, Germany

Purpose: In standard MRI, it may be problematic to differentiate residual tumor (RT) from scar, reactive changes, or recurrence after three months. Thus, the oncology societies are working towards establishing early postoperative MRI to evaluate residual tumors after resection of neuroblastoma. The aim of this study was to evaluate a short MRI protocol performed in the early postoperative period.

Materials and Methods: The inclusion criteria of this retrospective single-center study were: Histologically confirmed neuroblastic tumor, resection by the reference surgery in our center, performed early postoperative MRI and adequate MRI preoperatively, and standardized MRI Protocol. The MRI protocol included the following

sequences: T1w vibe Dixon before and after contrast, T2w with fat saturation and DWI with the calculation of the ADC map. The analysis was performed by 3 independent readers (resident/adults radiologist/board certified pediatric radiologist) using a 4-points Likert-scale (residual tumor is (1) very likely, (2) possible, (3) unlikely, (4) very unlikely). A multimodal reference standard was determined by: F/U imaging, the surgical report including intraoperative photographs, consensus tumor-board, and consensus between senior radiologist and surgeon.

Results: Thirty-nine patients with a median of 46 age months (5-177) and in 33 cases stage IV were consecutively included. MRI was performed in the mean 8 (+/- 5) days after surgery. RT was found in 13 patients by MRI and confirmed by the reference standard, with a typical location at the mesenteric root and retrocrural. 4 RTs were expected by the surgeons with a median volume of 19 ml (1-34 ml), and nine tumors were unexpected with a median volume of 1 ml (0.25-7). Sensitivity, specificity, and accuracy (reader) were 77, 54, and 70 % (Resident), 81, 85, and 82 % (Adult Radiologist), 92, 92, and 92 % (Pediatric Radiologist). Reading the postoperative MRI alone, the diagnostic performance of the Pediatric Radiologist were 88, 74, and 84%. **Conclusions:** Early MRI Protocol is feasible for determination of residual tumor. Experience in pediatric imaging is crucial to achieving high diagnostic precision. Reading the preoperative MRI improves diagnostic accuracy.

Two-year experience of Treatment of Osteoid Osteomas and Osteoblastomas in a Paediatric tertiary hospital

Dr. Rituparna Saha¹, Dr. Zishan Sheikh¹, Dr. Moti Chowdhury¹

1. Birmingham Children's Hospital

Purpose/Objective: Osteoid osteomas (OO) and osteoblastomas (OB) are benign bone tumours typically presenting with pain. This study describes a two-year experience of treating OO/OB with radiofrequency ablation (RFA) in children.

Materials: A retrospective review was performed of 26 patients with symptomatic OO/OB.

Methods: All patients had a biopsy prior to RFA either on the same attendance where radiological appearance was pathognomonic (n=21), or on separate attendance where imaging was equivocal (n=3). The RFA electrode was placed into the nidus under CT guidance, and thermo-ablation performed at 90°C for 6 min.

Results: Over this period, 26 patients (age 3-16 years) were diagnosed with OO/OB on imaging and/or biopsy. Lesions were in the spine (n=9), appendicular (n=16) and scapula (n=1), and ranged 7-22 mm in size, with 12/26 up to 10mm and 14/26 >10mm. 24/26 patients were treated with RFA; the remaining two following histological diagnosis underwent curettage (n=1) and cryotherapy (n=1). 19/24 patients receiving RFA were

successfully treated without relapse or residual symptoms. Five patients where symptoms were refractory/ recurred all had nidus >10mm; RFA was repeated in 2 and awaited in another. The remaining two patients refractory to RFA underwent surgical excision. 22/24 RFAs were uncomplicated post-procedure. One patient who had RFA of OO in the elbow had successful resolution of osteoid-related symptoms but developed radial nerve neuropraxia post-procedure, which resolved spontaneously with conservative management. One patient had post-procedure wound infection.

Correct placement of the biopsy needle and RFA electrode through the nidus was confirmed on CT in all patients; however histological identification of nidus was reported in 21/31 samples (67.7%; 5 biopsies repeated). In one case where biopsy was repeated, the repeat sample was also reported non-diagnostic, and the diagnosis was accepted based on characteristic imaging and symptomatic relief post-RFA.

Conclusions: The study concluded that RFA was successful in treating OO/OB in 79.2% of cases following one ablation, with incomplete ablation most likely in lesions >10mm. Symptom relief post-treatment was a more reliable guide of diagnosis than histology. Where biopsy was performed on a separate attendance prior to RFA treatment, a repeat biopsy is unnecessary during the RFA attendance.

Preoperative Multimodal Assessment of Functional and Metabolic Tumor Volume in Pediatric Rhabdomyosarcoma

Simon Männlin¹, Josephine Berger¹, Maryanna Chaika¹, Robert Grimm², Jörg Fuchs³, Andreas Schmidt³, Helmut Dittmann⁴, Jürgen Schäfer¹

1. Diagnostic and Interventional Radiology, University Hospital Tübingen, Tübingen, Germany

2. MR Application Predevelopment, Siemens Healthcare GmbH, Erlangen, Germany

3. Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital Tübingen, Tübingen, Germany

4. Department of Nuclear Imaging, University Hospital Tübingen, Tübingen, Germany

Purpose: Conventional cross-sectional imaging has failed to predict outcomes in pediatric rhabdomyosarcoma (RMS). Several studies have demonstrated the potential of advanced imaging such as diffusion-weighted imaging (DWI), gadolinium contrast enhanced imaging and 2-deoxy-2-fluoro-D-glucose positron emission tomography (PET). Due to the inhomogeneity of tumor volumes, recent studies have also shown the potential and the advantage of analyzing tumor volumes on a voxel-wise basis. Aim of this study is to evaluate the potential value of generating tumor subvolumes in pediatric RMS applying voxel-based analysis of functional and metabolic data from contrast enhanced PET/MRI.

Methods: 24 patients, who received PET/MRI after at least two cycles of chemotherapy, were enrolled. The volume of interest included whole tumor volume. Adherent diffusion coefficient (ADC) and standard uptake values (SUV) were measured on a voxel- wise basis as well as post gadolinium contrast enhancement in relation to mean muscle post gadolinium contrast enhancement. A gaussian mixture model was used to fit multiple gaussian distributions to the collective voxel- by- voxel data. Several different mixture models with up to twelve Gaussian distributions were fitted and compared using the Akaike information criterion and Bayesian information criterion. A mixture of seven distributions (Cluster 1- 7) was determined as best fit for the data. The ratio of these clusters to total tumor volume were correlated with clinical and histopathological parameters. The area under the receiver operating characteristic curve (AUC) of the various clusters was calculated using logistic regression analysis to predict event free survival.

Results: Significant differences of the ratios of clusters Cluster 1, Cluster 4 and Cluster 6 to total tumor volume could be found depending on whether embryonal or alveolar histopathologic subtype was present (each $p < 0.05$). Cluster 3 (AUC 0.868), Cluster 4 (AUC 0.789) and Cluster 5 (AUC 0.897) showed high AUC predicting event free survival of patients using logistic regression analysis.

Conclusions: These results show that voxel- wise analysis of multimodal data in RMS based on DWI, gadolinium contrast enhanced MRI and PET is feasible. The results also suggest, that the variance of the distribution of tumor subvolumes might have prognostic significance.

Virtual reality glasses: distraction technique to reduce sedation rates in children undergoing interventional radiology procedures

Elisa Aguirre Pascual¹, Carmen Gallego Herrero¹, Maria Navallas¹, David Coca Robinot¹, Maria Pont Vilalta¹

1. Pediatric Radiology Department Hospital 12 Octubre, Madrid

Background: Several sedation techniques, such as topic, oral, intravenous, or intramuscular, are used in children to perform interventional procedures. Recently, literature has shown virtual reality (VR) to be an effective non-invasive modality during induction of general anesthesia to reduce preoperative anxiety in children. The VR headset is a medical device class I that delivers a psychological intervention with a relaxation hypnotherapy software. The purpose of this distraction technique, used as a stand-alone therapy or combined with other therapies, is to ensure patient's comfort during medical procedures by reducing patient's anxiety and pain perception.

Purpose: This study was designed to evaluate the feasibility and effectiveness of immersive audiovisual distraction with a VR headset to reduce or avoid pharmacological

sedation in children subjected to interventional procedures.

Material and methods: An intervention pilot study was performed in children who agreed in advance to use the VR headset as a substitute of general anesthesia, deep or light sedation. Informed consent was obtained. Eligibility for inclusion was all consecutive children ages 6–16 years without severe psychomotor delay who needed an interventional procedure during the 6-months trial of the VR device. Children for whom the VR headset did not fit properly were excluded. Child pain level was assessed by using a Visual Analog Scale (VAS).

Results: 26 procedures were done in 24 patients (15 female) whose age ranged 5-18 years (mean 13.7 years, standard deviation 2.7 years). Two of them had mild psychomotor delay (7.7%). A variety of procedures were performed: fine needle aspiration (FNA) (n=3), FNA and percutaneous biopsy (n=6), percutaneous biopsy (n= 5), peripheral insertion of a central catheter (n=4), varicocele embolization (n=3), tunneled peripheral venous catheter removal (n=1), intramuscular tetanic toxoid infiltration (n=1), thoracic drainage (n=1), cervical abscess drainage (n=1) and hip arthrocentesis (n=1). Most patients were comfortable during the procedure (VAS ≤ 5 in 21 procedures). Two patients suffered intense pain (VAS=8) due to the nature of the invasive procedure (thoracic drainage and peripheral nerve biopsy). No complications were reported.

Conclusion: VR glasses audiovisual aid was found to be an effective distraction method in children who underwent minimal invasive interventional procedures.

Potential role of MRI-based radiomics in prediction of chemotherapy response in pediatric patients with Ewing-Sarcoma

Julia Miedler¹, Dr. med. Matthias Schaal¹, Jun.-Prof. Dr.-Ing. Michael Götz¹, Prof. Dr. Holger Cario², Prof. Dr. med. Meinrad Beer¹

1. University hospital of Ulm, Department for Diagnostic and Interventional Radiology, Ulm (Germany)

2. University hospital of Ulm, Department for Pediatrics and Adolescent Medicine, Ulm (Germany)

Purpose/Objective/Background: Neoadjuvant chemotherapy plays an essential role in pediatric Ewing-Sarcoma. Postsurgical histopathological examination for Salzer-Kuntschik regression grade represents the current gold standard to assess chemotherapy response. Since this occurs rather late during treatment, we addressed the resulting need for earlier predictive markers by assessing MRI-based radiomics signatures at baseline and under chemotherapy, focused on distinction between good (Salzer-Kuntschik grades 1-3) and poor response (Salzer-Kuntschik grades 4-6).

Materials&Methods: In this single-center retrospective study all pediatric Ewing-Sarcoma patients treated at our institution (n(2011-2020)=23) were primarily included. The final patient cohort consisted of 16 children, 9 with Salzer-Kuntschik regression grade (mean age: $12,61 \pm 2,93$; good response:n=5; poor response:n=4) without externally started chemotherapy, with consistent MRI protocols (T1-TSE native, T1-TSE fs contrast enhanced, T2-TSE and T2-TIRM/STIR) and with baseline (n(t0)=4/5 sequence depending) plus two follow-up examinations (after the 2nd/3rd [n(t1)=9] and after the 5th/6th [n(t2)=9] cycle of chemotherapy according to “EWING 2008”). Segmentation and radiomic feature extraction were performed using mint LesionTM (Heidelberg,Germany). Cohen’s *d* or Hedges *g* was calculated for features where the two groups showed different value ranges at t0. Separately, the further course from t0 to t1 and t1 to t2 was analyzed.

Results: In total 25 histogram based and 26 GLCM (gray-level co-occurrence matrix) based radiomic features as well as min., mean, and max. signal intensity were analyzed based on whole tumor volume.

Several radiomic features were found at t0. The highest Cohen’s *d*/Hedges *g* at t0 was found at “Minimum histogram gradient” in T2-TIRM/STIR including edema ($d=18,86[1,12-18,86]$).

In the further-course-analyzation from t0 to t1, one feature in T2-TIRM/STIR and 29 features in T2-TIRM/STIR including edema were found. From t1 to t2 one feature in T2-TIRM/STIR including edema was found. For most of these features patients with good response showed decreasing (mean change:-16%) and patients with poor responses increasing (mean change:+85%) values.

Conclusion: Radiomic features seem to have a potential to distinguish between children with good and poor response already before and during chemotherapy of Ewing-Sarcoma. Further multicenter studies with larger cohorts have to be done.

Thursday 8th 15:30h-17h

Child Abuse, Post-mortem And Miscellaneous Session

Rib fracture diagnosis in suspected abuse: computed tomography or radiographs (RECEPTOR): a multicentre diagnostic accuracy observational study

Nasser Alzahrani^{1,2}, Michael Paddock^{1,3}, Annmarie Jeanes⁴, Alan S. Rigby⁵, Amaka C. Offiah^{1,6}, On behalf of the RECEPTOR Study Research Group

1. Department of Oncology and Metabolism, University of Sheffield, Damer Street Building, Western Bank, Sheffield S10 2TH, United Kingdom

2. Diagnostic Radiology Department, College of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia

3. Medical Imaging Department, Perth Children’s Hospital, Perth, Western Australia, Australia

4. Department of Paediatric Radiology, Leeds Children’s Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom

5. Hull York Medical School, Hull, United Kingdom

6. Department of Radiology, Sheffield Children’s NHS Foundation Trust, Western Bank, Sheffield, United Kingdom

Purpose: Rib fractures are strongly associated with physical abuse in young children. Chest radiography is the standard imaging method for the diagnosis of rib fractures in children with suspected physical abuse (SPA). Studies have shown that chest computed tomography (CT) has greater accuracy than initial chest radiographs (CXR) in detection of acute and healing rib fractures in children with SPA. This multicentre study aims to assess the diagnostic accuracy of chest CT in the detection of rib fractures in children investigated for SPA using initial and follow-up CXR as reference standard.

Material and Methods: A ten-year (9/2011 to 9/2021) multicentre retrospective search of children under 2 years old who had CXRs as part of the initial and follow-up skeletal survey and chest CT performed for SPA. Radiologists were recruited as reporters on a voluntary basis via membership databases from the Child Abuse Taskforce of the European Society of Paediatric Radiology. The anonymised CXRs and CT data sets were sent to the readers via a password-protected and encrypted filesharing website (Google Drive). Radiologists independently read images in three reads: Read 1 (initial CXRs only), Read 2 (CTs only) and Read 3 (initial and follow-up CXRs), performed at least one month apart and the order of reads 1 and 2 were varied between observers, but no observer performed Read 3 before Read 1 or 2. Radiologists reported on the presence of rib fractures, fracture age, fracture location and the confidence level of interpretation. The diagnostic accuracy will be assessed by calculating sensitivity, specificity, positive predictive value, and negative predictive value.

Results (Still in progress): A total of 64 cases (34 male) with an average age of 3 months were included and independently assessed by 19 consultant radiologists. Data analysis is on-going and results of diagnostic accuracy will be presented at the conference.

Conclusion: Chest CT might appear to offer improved diagnostic accuracy in the detection of rib fractures in live children who may have been abused, thus rendering CXRs as part of the follow-up SkS redundant.

International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse

Jai Sidpra¹, Kshitij Mankad², David M Mirsky³, Adam J Oates⁴, Gabrielle C Coleman⁵, Leandro T Lucato⁶, Elaine

Kan⁷, Tracy Kilborn⁸, Nina Agrawal⁹, Arianne H Teeuw¹⁰, Patrick Kelly¹¹, Deborah Zeitlin², Jamieson Carter¹², Geoff D Debelle⁴, Rachel P Berger¹³, Cindy W Christian¹⁴, Daniel M Lindberg³, Maria Raissaki¹⁵, Maria Argyropoulou¹⁶, Catherine Adamsbaum¹⁷, Timothy Cain¹⁸, Rick R van Rijn¹⁰, V Michelle Silvera¹⁹, Andrea Rossi²⁰, Alison M Kemp²¹, Arabinda K Choudhary²², Amaka C Offiah²³

1. University College London
2. Great Ormond Street Hospital for Children
3. Children's Hospital Colorado
4. Birmingham Children's Hospital
5. Children's Health Ireland and The National Maternity Hospital
6. Universidade de São Paulo
7. Hong Kong Children's Hospital
8. Red Cross War Memorial Children's Hospital
9. City University of New York Graduate School of Public Health and Health Policy
10. Emma Children's Hospital – Amsterdam UMC
11. Starship Children's Health
12. Brighton and Sussex Medical School
13. UPMC Children's Hospital of Pittsburgh
14. The Children's Hospital of Philadelphia
15. University Hospital of Heraklion
16. University of Ioannina
17. Paris Saclay University
18. Royal Children's Hospital Melbourne
19. Mayo Clinic
20. IRCCS Istituto Giannina Gaslini
21. Cardiff University
22. University of Arkansas for Medical Sciences
23. Sheffield Children's Hospital

Objectives: Physical abuse is a common but preventable cause of long-term childhood morbidity and mortality. Despite the strong association between abuse in an index child and abuse in contact children, there is no guidance outlining how to screen the latter, significantly vulnerable group, for abusive injuries. In consequence, the radiological assessment of contact children is often omitted, or variably performed, allowing occult injuries to go undetected and increasing the risk of further abuse. We present an evidence-informed international consensus statement for the radiological screening of contact children in the context of suspected child physical abuse.

Methods: This consensus statement is derived from a systematic literature review and 3 meetings of the International Consensus Group on Contact Screening in Suspected Child Physical Abuse: a panel of 26 experts invited to participate in this modified Delphi consensus process. Participating board-certified (or equivalent) experts included 9 child abuse paediatricians, 9 paediatric radiologists, 7 paediatric neuroradiologists, and 1 emergency

medicine physician with a minimum post-qualification experience of 10 years in the management of children with suspected physical abuse. Consensus was defined as $\geq 80\%$ agreement. The consensus statement was reviewed and endorsed by all authors.

Results: Contacts are defined as the asymptomatic siblings, cohabiting children, or children under the same care as an index child with suspected child physical abuse. All contact children should undergo a thorough physical examination and a history elicited prior to imaging. Contact children aged less than 12 months should have neuroimaging, the preferred modality for which is magnetic resonance imaging, and skeletal survey. Contact children aged 12–24 months should undergo skeletal survey. No routine imaging is indicated in asymptomatic children aged over 24 months. Follow-up skeletal survey with limited views should be performed if abnormal or equivocal at presentation. Contacts with positive findings should be investigated as an index child.

Conclusions: We report consensus recommendations for the radiological screening of contact children in the context of suspected child physical abuse: establishing a consistent approach to the evaluation of these at-risk children and providing clinicians with a reference standard from which to advocate for them.

Combined Prenatal US and Post-mortem fetal MRI: can they replace conventional autopsy for fetal body abnormalities?

Marine Moeremans¹, Fred E. Avni¹, Nicky d'Haene², Ngoc My Lam², Thierry Metens³, Aurélie D'Hondt¹

1. Department of Radiology, Hôpital Delta (CHIREC), 1160 Brussels, Belgium
2. Department of Pathology, Hospital Erasme, Université Libre de Bruxelles (ULB), 1070 Brussels, Belgium
3. Department of Radiology, Hôpital Erasme, Université libre de Bruxelles (ULB), 1070 Brussels, Belgium

Background: The acceptance of conventional autopsy (CA), the gold-standard method for investigating fetal death, often remains problematic. Post-mortem Magnetic Resonance Imaging (PMMRI) is increasingly advocated, particularly for neurologic malformations. However, PMMRI performances to diagnose non-neurologic malformations remains unclear. We aim to clarify whether a full body CA remains needed after prenatal ultrasound (US) and PMMRI in assessing non-neurologic fetal malformations.

Methods: In this retrospective IRB-approved study, during a six-year period, all fetuses who underwent PMMRI, prenatal US and full body CA were included. Body abnormalities were identified in US, PMMRI and CA reports and graded as major (two points) or

minor (one point). Each technique (US, PMMRI, CA) was given a score by adding all grading points. In each fetus, results were compared for both separate and combined US and PMMRI to CA. Sensitivity and specificity were calculated for detecting major abnormalities. **Results:** 50 fetuses were included. The score of CA, US and PMMRI was respectively 53, 37, 46. In comparison with combined US-PMMRI, CA added information in 2 cases (4%) with major abnormalities and 7 cases (14%) with minor abnormalities. PMMRI and prenatal US were concordant in 36/50 (72%) fetuses. Separate US/PMMRI sensitivities and specificities for detecting major body malformations respectively were 80%/80% and 100%/94%. Combined US-PMMRI had a sensitivity of 90% and a specificity of 94%. Two cardiac malformations (2/6) were only described by CA. **Conclusions:** After prenatal US and PMMRI, few additional fetal body malformations are discovered with CA. Nevertheless, fetal heart autopsy remains mandatory.

Submission Preview: Structuring International Pediatric Radiology coverage at a major United States Academic Children's Hospital

Benjamin Taragin, MD¹, CAthleen Egan¹, Susan Sotardi¹, Summer Kaplan¹

1. Childrens Hospital of Pennsylvania

Background: Historically, International Teleradiology (IT) has been a useful Radiology enterprise resource providing overnight coverage to small group hospital-based practices, remote practices or outpatient practices with volume overflow.

Previously enacted United States governmental regulations have negatively impacted IT's utility in tertiary care centers and other centers with large population of government-sponsored insurance. Pediatric Radiology is currently experiencing a tremendous shortage of clinical providers. This is coupled with increased volumes of up to 50% at Major pediatric centers and further volume influx of telerad contracts and responsibilities. Existing national pediatric Radiology staffing shortages are also exacerbated by increasing hospital demands for 24-Hour attending coverage in tertiary pediatric teaching hospitals. Increasing on call responsibilities and challenges of inadequate overnight coverage have been listed as major causes of radiologist burnout. We describe the creation and effect of ABR certified pediatric IT at a major U.S. Pediatric Hospital. **Methods:** Metrics used to assess the change in functionality of the radiology department with increased staffing included turnaround times for all studies performed during the overnight shift on nights when additional staffing was and was not available and staff surveys performed at the end of the overnight shifts both with and without additional coverage.

Materials: Problems and solutions addressed include including provider selection, resource selection, connectivity issues and redundancy, state license ship, remuneration scale and logistics, Hospital onboarding, RIS case-sorting and selection as well as legal & financial planning. Specific technical issues that will be addressed include acquisition of required diagnostic computers, monitors, internet speed requirements, redundancy of the above, Meraki or other vendor Vpn, institutional network connectivity, including telephone and videoconferencing. **Conclusion:** Upon successful creation of this position there was improved departmental functionality as defined by report turnaround time as well as improved job satisfaction and morale of existing in house staffing. Ultimately the creation of subspecialty specific international teleradiology positions has the potential to alleviate subspecialty specific Radiology Staffing shortages in academic centers and associated burnout.

CT carbon calculator

Michael Jackson¹, Debbie Harries¹, Vivek Raja¹

1. NHS Lothian, University of Edinburgh

Background: Manifestations of the climate crisis are occurring with increasing frequency and alarming severity. Healthcare providers are committed to the principles of non-maleficence and justice. High-energy resources such as CT and MRI must therefore be used judiciously.

Aim: To develop a web-based application providing an estimate of the carbon footprint of specific CT examinations. Inclusion of such an estimate in radiology reports will prompt clinicians and radiology staff to renew efforts to eliminate unnecessary imaging, and will provide impetus to industry partners to develop energy efficient machines.

Methods: Medical physics and a computer scientist used measurements of scanner consumption obtained by a group in Australia [1]; other published figures[2]; local dose audit data (adult and paediatric); and previously established relationships between various patient size surrogates and CTDI_{vol} to develop approximate relationships between kWh energy usage and various user inputs. These inputs were: body region; and either DLP, patient weight, or patient age. A simple to use web-based interface was constructed allowing users to select relevant criteria to tailor the estimate to specific cases. The more criteria provided (for example, scan DLP as well as age), the more accurate the estimate will be, but an approximate estimate can be delivered based on scanned body region and patient weight or age.

Results: The application is anticipated to be online by the time of the meeting. Typical carbon cost of a CT scan is approximately 15.5 KgCO₂ e, although electricity consumption at the point of scanning only represents a small fraction of this total (0.06 – 0.29 kWh per paediatric chest scan; 0.13 – 0.067 kg of CO₂ per scan).

Conclusion: Inclusion of carbon footprint in radiology reports can act as a behavioural “nudge” to help reduce unnecessary imaging and to promote energy efficiency. The introduction of this CT carbon cost calculator will hopefully stimulate further efforts to deliver imaging in a climate-aware fashion.

References:

[1] The carbon footprint of hospital diagnostic imaging in Australia Scott McAlister,^a * Forbes McGain,^b Matilde Breth-Petersen,^c David Story,^d Kate Charlesworth,^e Glenn Ison,^f and Alexandra Barratt The Lancet Regional Health - Western Pacific 2022;24: 100459

[2] The Energy Consumption of Radiology: Energy- and Cost-saving Opportunities for CT and MRI Operation Tobias Heye, Roland Knoerl, Thomas Wehrle, Daniel Mangold, Alessandro Cerminara, Michael Loser, Martin Plumeyer, Markus Degen, Rahel Lüthy, Dominique Brodbeck, and Elmar Merkle. Radiology 2020 295:3, 593-605

Prevalence of metaphyseal fractures in infants with and without evidence of abusive head injury: Does shaking cause metaphyseal fractures?

Um-Kalsum Rashed¹, Amaka Offiah², Daniel Connolly³

1. The Medical School, University of Sheffield, ukrashed1@sheffield.ac.uk

2. Sheffield Childrens Hospital, a.offiah@sheffield.ac.uk

3. Sheffield Childrens Hospital, daniel.connolly1@nhs.net

Background: Metaphyseal fractures (or classic metaphyseal lesions, CMLs) were first linked to abuse in 1957 by Caffey and have since been identified as a highly specific marker of physical abuse in infants. The mechanism of injury linked to these fractures may be consistent with those exerted when an infant is shaken. This study tests the hypothesis that shaking is a cause of CMLs.

Material and Methods: We performed a retrospective review of all radiographs of infants investigated for suspected child abuse over a period of 15 years. Infants who had a skeletal survey for inflicted injury and a CT head were identified and number and type of fractures and presence of features of shaking were extracted from the reports and medical notes. Statistical analysis (independent t-test and linear regression) was performed using SPSS Version 28 for Mac. The level of significance was set at $P < 0.05$.

Results: A total of 102 infants had at least one of the following: fracture at other location ($n=50$), shaking feature ($n=34$), skull fracture ($n=43$) or CML $n=9$. The prevalence (per patient) of CMLs in infants with and without at least one feature of shaking was 5.9% and 5.6%, respectively ($P=0.95$). Of 28 infants ≥ 40 weeks of age, only 1 (3.6%) had any feature of shaking ($P < 0.001$), however age did not correlate significantly with presence of CML ($P=0.079$). The number of shaking features per patient

ranged from 1 to 5. Correlation between the number of shaking features and presence of CML for the whole group and for the 34 with at least one shaking feature was not significant ($P=0.938$ and 0.989 , respectively).

Conclusions: Although the overall number of CMLs in the study cohort was small (8.8%), 33% of recruited infants had at least one feature of shaking, without a statistically significant number of CMLs compared to the non-shaken group. Results suggest that shaking is unlikely to be a mechanism for CMLs. Validation in a larger cohort may be warranted.

When Greens Are Not So Good for You. Soft Tissue Foreign Bodies: a Radiology and Plastic Surgery Perspective

Dr Fiona Katherine McCurdie^{1,2}; Dr Harsimran Laidlow-Singh²; Mr Simon Filson¹; Miss Jana Torres-Grau²; Dr Rui Santos²

1. Evelina London Children's Hospital

2. Guy's and St Thomas' NHS Foundation Trust

Objectives: Suspected soft tissue foreign body (FB) is a common presentation in paediatrics. These cases are often a diagnostic and radiological challenge, particularly when the FB is organic matter. Timely recognition and management of retained FB are essential to avoid potential significant consequences.

We present a series of occult and unusual FB cases from our tertiary centre, with examples of multimodality imaging and intraoperative photographs.

We propose an imaging pathway for use in the radiology department that aids the management of these cases.

Methods & Materials: Cases were identified by reviewing all imaging investigations for FB, and the plastic surgery caseload, over the last 5 years. We reviewed multimodality imaging characteristics, details of clinical presentation, intra-operative findings and photographic documentation.

In addition, we undertook a literature review and reviewed UK and international imaging guidelines.

Results: We present a series of unusual, complex and occult FBs, including: cactus spines, large shards of wood, glass, needles and metallic debris.

Organic FBs tend to be occult on plain radiograph. Secondary signs (periosteal reaction, soft tissue swelling) can alert to the presence of an occult FB. In these cases, CT is rarely specific enough to add value and so should be avoided, to minimise ionising radiation.

Ultrasound is useful to identify FB and FB reaction, sinus or abscess formation. It has limits in further characterising the FB and rarely helps identify bone involvement.

MRI is extremely useful and demonstrates inflammatory/infective sequelae. Multiplanar reformatting is helpful for operative planning.

Whilst there is recognised international imaging guidance for ingested or inhaled FBs, there is little guidance for the

management of soft tissue FBs. We propose an imaging pathway for soft tissue FBs from our department.

Conclusions:

- Soft tissue FBs are common in paediatrics and present a diagnostic and radiological challenge.
- Close liaison with clinical colleagues is essential to tailor appropriate imaging.
- Organic FBs are rarely radiopaque and plain radiograph and CT are limited. Ultrasound and MR are superior and offer information about inflammatory/ infectious sequelae.
- We propose an imaging pathway for soft tissue FBs and share experiences from our centre.

Imaging findings of head and neck juvenile xanthogranuloma, in 10 patients

Chalard F¹, Nguyen T¹, Donadieu J², Ducou le Pointe¹

1. Hopital Armand Trousseau, Pediatric radiology
2. Hopital Armand Trousseau, Pediatric onco-hematology

Purpose: Juvenile xanthogranuloma (JXG) is the commonest non-Langerhans cell histiocytosis, occurring mainly in infancy. The skin is the most frequent site of JXG, the lesions being located in the head, the neck or the trunk. The diagnosis of extra cutaneous JXG is challenging, due to its rarity, as well as its wide clinical spectrum ranging. Here we propose to demonstrate and characterize imaging features of ten patients with JXG of the head and neck in various locations.

Material and methods: From a cohort of 58 JXG presented to our hospital between 2006 and 2021, we selected the ten JXG located in the head and neck. We recorded clinical data and reviewed all imaging studies. Seven patients had a magnetic resonance imaging (MRI), one had an ultrasound (US) and two had an US, a computed tomography (CT) as well as MRI. We chose the following imaging characteristics: echogenicity and vascularization on US, spontaneous density on CT, signal intensity on T₂-weighted image, apparent diffusion coefficient (ADC) and enhancement on MRI, tumor boundaries and bone lesion on all studies.

Results: Of the ten patients, there were eight patients below the age of two years (one below the age of one year) and two above the age of two. The lesions were located in the skin, the soft tissues, the skull and the intra cranial compartments. Tumors were well-defined in eight cases and bone erosion was present in three cases. On US, the appearance of the lesions was either hypo or hyper echoic and with or without vascularization. On CT, the lesions were spontaneously hyper dense. On MRI, the lesions were hypo intense on the T₂ image in six of nine patients, had a low ADC in six of seven patients and enhanced in seven out of seven patients.

Conclusions: The diagnosis of extra cutaneous JXG is difficult, but may be proposed, based on the following non-specific but suggestive imaging criteria: well-defined lesion,

enhancement, T₂ hypo intensity and low ADC components and possible adjacent bone destruction.

Imaging findings of pulmonary and extrapulmonary sarcoidosis in children

Gozde Ozer¹, H. Nursun Ozcan¹, Nagehan Emiralioglu Ordukaya², Rahsan Gocmen¹, Berna Oguz¹, Nural Kiper², Mithat Haliloglu¹

1. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey
2. Department of Pediatric Pulmonology, Hacettepe University School of Medicine, Ankara, Turkey

Background: Sarcoidosis is about ten times less common in children than adults, therefore there is still limited data in the literature concerning pediatric sarcoidosis. Although lungs and hilar lymph nodes are the most common affected organs, multiorgan involvement is more common in children than in adults. This study aims to describe pulmonary and extrapulmonary imaging findings in pediatric sarcoidosis patients.

Materials and Methods: The radiology archives were searched to identify patients diagnosed with sarcoidosis between 1995-2022. A total of 21 patients (10 boys and 11 girls, mean age 13.1) with sarcoidosis were found. Demographic features, initial symptoms, and follow-up data were noted. Histopathologic confirmation, initial chest radiographs and CTs, and extrapulmonary radiologic evaluations of patients were reviewed retrospectively.

Results: The most common presentations were constitutional symptoms including fever and weight loss. Histopathologic confirmation was available for 17 patients and the most common biopsy site was lymph nodes (n=9). Initial chest radiographs were evaluated according to the Scadding staging system and 7 patients had stage 0 (30%), 6 patients had stage 1 (28%), and 8 patients had stage 2 (38%) disease. There were no stage 3 and 4 diseases at the time of diagnosis. On CT, mediastinal/ hilar lymphadenopathies (n=14) and perilymphatic nodules (n=14) were the most common imaging findings, followed by peribronchial thickening (n=9). Pulmonary fibrosis was developed in two patients with stage 2 disease at the time of diagnosis. Multiorgan involvement was found in 18 patients and three or more organs involved in 10 patients. The most common extrapulmonary findings were splenomegaly (n=10) and peripheral/intraabdominal lymphadenopathies (n=8). Other common involvement sites were eye (n=8), parotid gland (n=4), and central nervous system (n=3).

Conclusions: Chest involvement patterns of sarcoidosis seem to have some differences from adults. In this study, unlike adults, stage 3 and 4 pulmonary diseases at the initial diagnosis were not found. Also multiorgan involvement is frequent in children and the most common extrapulmonary imaging findings were splenomegaly and lymphadenopathy.

Significant increase in complicating upper respiratory tract infections in children during the 2022/2023 winter season – a post COVID effect?

Corona Metz¹, Simon Veldhoen¹

1. Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Pediatric Radiology, Berlin, Germany

Purpose/Objective/Background: Upper respiratory tract infections usually peak during winter months. The purpose of this study was to investigate a clinically noticeable increase in imaging of complicating upper respiratory tract infections in children during the winter season of 2022/2023.

Materials/Methods: MRI and CT scans of children (<18years) with upper respiratory tract infections performed in the Department of Radiology between October 2022 and March 2023 were analyzed regarding presence of the following complications: Mastoiditis, abscess, phlegmon, meningitis, reactive vasculitis, and sinus vein thrombosis. If pathogen detection was performed, this information was obtained. Data were compared with MRI and CT scans performed in the same months of the last four years, distinguishing between pandemic and pre-pandemic years.

Results: During the 2022/2023 winter season, the number of MRI and CT scans in children with upper respiratory tract infections (mean age, 6±5years; median age, 6years; mean prior age, 8±6years; median prior age, 7years) increased significantly compared to the four prior winter seasons (n=89, prior mean n=29; p=0.01). Image-based diagnosis of complications increased significantly (n=80, prior mean n=22; p=0.01). The complication rate increased from an average of 72% to 90%, which did not reach the level of statistical significance (p=0.06). Particularly, vascular complications increased from three cases within the last four years to seven cases in the recent winter season. In 80 of 89 cases the pathogen detection was available with 70% bacterial infections (prior 21 of 29 cases, average rate of 65% of bacterial infections; p>0.05). 80% of those were caused by streptococcus species (prior mean 65%; p>0.05).

During the first complete pandemic winter season in Europe (2020/2021) a significantly reduced number of CT and MRI scans of (complicating) upper respiratory infections in children and a significantly decreased complication rate was observed compared to the pre-pandemic winter seasons, the second pandemic (2021/2022) and the recent winter season (all p<0.5).

Conclusions: After a decline during the first pandemic winter season, there was a marked rebound in imaging complicating upper respiratory tract infections in children, with a significant increase in cases during the 2022/2023 winter season compared with the years before and during the pandemic.

Clinico-radiological rounds with ultrasonography in neonatal intensive care unit

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Prashanth Gowda²

1. Sri Devraj Urs Academy of Higher Education and Research Tamaka, Kolar, Karnataka, India

2. Motherhood womens and children Hospital, Bengaluru, karnataka, India

Purpose:

- Setting protocol for neonatal imaging along with neonatologists.
- Assessing progress of the pre term babies in routine clinic-radiological rounds.
- Utilization of doppler in evaluation of intracranial pressure in hydrocephalus and prognostic indicator of infarcts.
- Effectiveness of approach by Pediatric Radiologist in presence of Neonatologists.
- Validating clinical spectrum with imaging findings.

Methods & Materials:

- Prospective study of neonatal ultrasonography in neonatal intensive care unit across multiple mother and child hospital.
- Sample size of 1000 neonates including preterm and term babies over a period of 2 years.
- Routine clinic-radiological rounds with neonates and registrars in evaluation of term and preterm neonates.
- Ultrasonography includes cranium, abdomen and pelvis, hip joints, chest, neck, extremities and doppler valuation of vessels.
- Majority of cases were having Neurosonogram in preterm neonates with serial evaluation.
- Clinicians include Neonatologist, Resident Pediatricians, Pediatric surgeons, fellows and Locum pediatricians.

Results: New protocol has been set in neonatal intensive care unit for performing ultrasonography. Standardizing normal parameters taken during clinic-radiological rounds including size of organs, resistive index of arterial doppler, etc. Periventricular leukomalacia in most common findings in preterm brain. Intracranial haemorrhages are most common complication in preterm neonates. Early necrotizing enterocolitis is detected as early as 3rd day of life. Perforation is commonly seen with necrotizing enterocolitis and meconium ileus. Resistive index of anterior cerebral artery doppler study is best indicator of intracranial pressure in hydrocephalus. Chest ultrasonography is best method in identifying minimal pleural effusion and identifying pneumonia in hidden areas of chest radiograph. Timing of study is fixed and followed over a period of time, for example hip ultrasonography, renal pelvicalyceal dilatation of pelviureteric junction obstruction.

Conclusion:

1. Clinico-radiological rounds is essential and novel approach in neonatal intensive care unit.
2. Improved assessment of neonates with combined clinical and radiological evaluation.
3. Eliminating discrepancies in clinical and radiological findings thus helping clinician for better treatment options. New protocol generation and application for routine assessment of neonates with ultrasonography in presence of clinicians.

Friday 9th 9h-9:30h**GI and GU Session****Shear wave elastography and shear wave dispersion correlated to biopsy in scheduled follow-up of pediatric liver grafts**

Ivan Cetinic^{1,*}, Charlotte de Lange^{1,2}, Nils Ekvall³, Gustaf Herlenius⁴, William Bennet⁴, Kerstin Lagerstrand^{5,2}, Hanna Hebelka^{1,2}

1. Department of Radiology & Pediatric Radiology, Sahlgrenska University Hospital, Gothenburg, Sweden
2. Institution of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Sweden.
3. Department of Pediatric Medicine, Sahlgrenska University Hospital, Gothenburg, Sweden
4. Department of transplantation surgery, Sahlgrenska University Hospital Gothenburg
5. Department of Medical Physics and Techniques, Sahlgrenska University Hospital, Gothenburg, Sweden

*Correspondence: ivan.cetinic@vgregion.se; Tel.: +46-(0)-31-3427926

Background: Uncomplicated grafted livers in adult recipients have been shown to display increased liver stiffness, reflected as increased ultrasound shear wave elastography (2D-SWE) values, however, this has not been systematically verified with histopathology. Further, it is unknown if this also applies in pediatric liver recipients and how the shear wave dispersion (SWD) value, as a potential marker of inflammation/edema, is displayed in pediatric patients.

Purpose: To compare 2D-SWE and SWD values with histopathology in pediatric liver recipients admitted for an elective follow-up.

Material and methods: In 45 consecutive pediatric liver recipients [median age 10.9 years (ranges 1.4-18), 25 males (55,6%)], all part of a longitudinal follow-up (range 6 months to 17 years) after liver transplantation, 2D-SWE was performed in conjunction with an elective liver biopsy. Additionally, SWD was also obtained in 20 of the 45 children. SWE values were compared to histologically none to mild fibrosis (F0-1) and moderate to severe fibrosis (F2-4) respectively. Inflammation was digitomized

into low grade (grades 0-1) and higher grades (grades 2-4) of inflammation. Both fibrosis and inflammation were graded according to Batts & Ludwig classification system.

Results: The number of individuals and median (range) of SWE value (kPa) for each stage of fibrosis was; F0-1 [n=23; 5.8 (3.2-16.1)], F2 [n=21; 6.0 (4.5-25.9)], F3 [n=1; 33.3], F4 [n=0]. No significant difference in SWE values was found between F0-1 versus F2-4 ($p=0.062$). The median SWD value in the 20 patients with low-grade inflammation was 13.7 m/s Khz (10.7-17.6). No patient had high-grade inflammation. Low correlation was found between SWE and fibrosis ($r = 0.2$; $p=0.09$) as well as between the SWD and fibrosis ($r=0.23$; $p=0.32$). The area under the receiver operating characteristic (AUROC) differentiating F0-1 from F2-4 was 0.62 (95% CI:0.45-0.78). A cut-off SWE of ≤ 4.7 kPa yielded 96% sensitivity and 73% specificity to rule out significant fibrosis (F2-F4).

Conclusion: Clinically uncomplicated grafted livers in a small pediatric cohort revealed slightly increased liver stiffness and dispersion than previously reported in healthy controls. Histologically high-grade fibrosis displayed great variability in stiffness values but without significant difference to low-grade fibrosis.

Liver MR and US elastography correlation to 4D flow and lymphatic stasis in pediatric Fontan circulation

Charlotte de Lange^{1,2}, Staffan Gustafsson^{2,3}, Britt Marie Ekman-Joelsson^{2,3}, Jan Sunnegårdh^{2,3}, Mats Synnergren^{2,4}, Pär Arne Svensson¹, Hanna Hebelka^{1,2}, Kerstin Lagerstrand^{2,5}, Frida Dangardt^{2,3}

1. Dept. of Pediatric Radiology, Queen Silvia Childrens' Hospital
2. Institute of Clinical Science, Sahlgrenska Academy, University of Gothenburg,
3. Dept. of Pediatric Cardiology, Pediatric Heart center, Queen Silvia Childrens' Hospital,
4. Dept of Cardiovascular and thoracic surgery , Pediatric Heart center, Queen Silvia Childrens' Hospital,
5. Dept of Medical Physics, Sahlgrenska University Hospital.

Background: Patients with Fontan circulation have increased central venous pressure and lymphatic obstruction leading to Fontan associated liver disease. Non-invasive assessment of development of fibrosis is difficult due to confounding inherent congestion.

Purpose: Can Magnetic resonance elastography (MRE), ultrasound shear-wave elastography (SWE), ultrasound shear-wave dispersion (SWD) and MR relaxometry be used in assessing liver fibrosis and congestion in pediatric patients? Is degree of lymphatic stasis related to liver stiffness?

Methods: Thirteen pediatric patients with Fontan circulation admitted for annual cardiac follow up, were prospectively included. Hepatic and cardiac MR including cardiac

function, 4D flow, lymphography, T1- and T2 mapping and MRE, as well as hepatic SWE and SWD were performed. MR lymphatic stasis pattern was classified in 4 groups (class 1=no stasis up to class 4=severe stasis).

Statistical analysis for correlations between elastography, flow, relaxometry and cardiac function were performed.

Results: 3T MRI and ultrasound were performed in 13 patients, median age 14 years (range 3-18), 9 males (64%). MR lymphography (n=12) revealed class 2 in 2 patients and class 3-4 in 10 patients.

Liver stiffness was increased, MRE 5.0 ± 1.9 kPa, SWE 17.3 ± 9.9 kPa, as well as liver viscosity (SWD) 15.9 ± 3.9 m/s Khz, and hepatic T1 times 898 ± 106 ms and T2 times 46.7 ± 8.3 ms, as compared to previously reported adult and pediatric normal values. MRE was correlated to flow in Fontan circuit, 4.9 ± 2.2 L/min (R 0.7-0.8, $p=0.02-0.03$) but not to SWD or T1 and T2 times (R 0.1-0.3, $p=0.4-0.8$). SWE correlated to MRE and SWD, both R 0.7, $p=0.01$. MRE and SWE showed no correlation to lymphatic stasis (R 0.3, $p=0.4$), nor to cardiac function, endiastolic volume index 95 ± 23 ml/m² and ejection fraction $52 \pm 10\%$ (R 0.1- -0.3 $p=0.06-0.9$).

Conclusion: This pilot study revealed increased liver stiffness (MRE, SWE), viscosity (SWD) and relaxometry values in children with Fontan circulation. MRE seems to relate to flow in Fontan circuit but not to cardiac function or degree of lymphatic stasis. Neither MR relaxometry nor SWD, a potential marker of oedema/congestion, were associated with lymphatic stasis in this small cohort.

Liver shear wave elastography and portal venous doppler estimation before and after meal in pediatric patients with diffuse liver disease

Tijana Radovic^{1,2}, Ivana Dasic¹, Sofija Cvejic¹, Nina Ristic^{2,3}, Ivan Milovanovic^{2,3}, Milica Radusinovic³, Irena Djoric³, Zoran Lekovic^{2,3}, Polina Pavicevic^{1,2}

1. University Children's Hospital Belgrade, Department of Radiology

2. University of Belgrade, Faculty of Medicine

3. University Children's Hospital Belgrade, Department of Gastroenterology and Hepatology

Background: Liver stiffness (LS) is increasingly used in the non-invasive evaluation of chronic liver diseases in pediatric patients of all age. It correlates with hepatic venous pressure gradient in patients with high grade fibrosis and cirrhosis and holds prognostic value in this population. Hence, accuracy in its measurement is needed. Several factors independent of fibrosis influence liver stiffness. However, the information on whether meal ingestion modifies liver stiffness in fibrosis and cirrhosis in pediatric patients with diffuse liver disease are highly lacking.

We aimed to evaluate the effect of meal intake on liver stiffness in pediatric patients with diffuse liver disease with or without fibrosis/cirrhosis as confirmed by biopsy.

Methods: We investigated 10 pediatric patients after an overnight fast (8 male, mean age 12.9 ± 3.66 yrs. - 3 with autoimmune hepatitis, 1 with juvenile polycystic kidney disease and hepatic fibrosis, 3 with idiopathic portal vein thrombosis and cavernous transformation, 2 with alfa 1 anti-trypsin deficit and 1 with cystic fibrosis) of which five had liver fibrosis stage F2 and higher and five had normal biopsy results. Liver stiffness (point shear-wave elastography) and portal blood flow (PBF- Doppler-Ultrasound) were measured before and 45 minutes after receiving a mixed meal.

Results: Mean LS value before meal was 9.06 ± 6.68 kPa, while mean post-prandial value was 7.81 ± 5.32 kPa, with significant correlation between two values ($r=0.99$, $p<0.001$) and highly significant difference as estimated by paired t-test ($p=0.026$). Mean LS value before meal in group of patients with fibrosis was 13.5 ± 7.11 kPa and in patients without fibrosis 4.6 ± 0.76 kPa, post-prandially 11.12 ± 6.01 kPa vs 4.5 ± 0.21 kPa respectively, with highly significant difference in LS between groups ($p=0.001$ and $p=0.04$). Mean PBF value before meal was 20.84 ± 7.06 cm/s and after meal was 26.48 ± 10.19 cm/s, with significant difference in blood flow in pre and post-prandial phase ($p=0.036$). Reverse correlation of delta in values before and after meal in LS and PBF was moderate ($r=-0.564$) and showed no statistical significance ($p=0.09$).

Conclusion: The results of the present study represent the confounding effect of a meal on the accuracy of LS measurements for the prediction of fibrosis stage and its decrease in values in pediatric patients with diffuse liver disease.

Quantified Motility MR Enterography Response Assessment in Paediatric Inflammatory Bowel Disease

R Meshaka¹, H Fitzke¹, A Menys¹, K Jones¹, K Rupasinghe¹, J Barber¹, T Watson¹

1. Great Ormond Street Hospital for Children

Background: Small bowel disease response assessment using MR enterography (MRE) in paediatric inflammatory bowel disease (PIBD) is subjective. Scoring systems, such as Simplified Magnetic Resonance Index of Activity (sMaRIA), can be time consuming and not used in routine practice.

Quantified bowel motility using cine MRE correlates with histopathology at the terminal ileum (TI) and increases after 6-weeks of biologic therapy in small paediatric cohorts, making it a potential objective biomarker. It is unknown if motility score can reliably detect response in clinical cohorts.

Methods: This study was approved by local ethics committee (REC 10-H0-720-91). A single centre, retrospective search included all patients <18 years with PIBD and >1MRE between 2012-2022. The cine images from each patient's first two MREs were processed using FDA approved GIQuant®. Two paediatric radiology consultants

provided sMaRIA and motility scores (arbitrary units) at TI + worst affected segment (if not TI). Radiological response was defined by a decrease in sMaRIA of ≥ 2 . Clinical response was determined by a paediatric gastroenterologist's physician's global assessment (PGA).

Changes in motility score were compared in clinical and radiological responders versus non-responders (unpaired Mann Whitney).

Results: There were 64 patients (33 male) aged 5-16: 21/64 (33%) responders, 37/64 (58%) non-responders, 6/64 (9%) no active disease based on PGA; 8/64 (12%) responders, 42/64 (66%) non-responders, 13/64 (20%) no active disease based on sMaRIA with 1 exclusion (complex ileostomy case with surgical complications). Expert consensus using sMaRIA showed limited agreement with clinical assessment of up to 65%.

The motility score at the most severe segment increased in clinical responders versus non-responders: median +27 versus -42 ($p=0.058$, 0.009 for 2 readers). This was particularly true for non-TI segments: median +145 compared to -16 ($p=0.01$ and 0.0002).

There was numerical, but no significant difference in motility score change in responders versus non-responders classified radiologically by sMaRIA: median +35 compared to -19 for responders and non-responders, respectively ($p=0.14$ and 0.19).

Conclusion: In this relatively large clinical PIBD cohort, increasing motility corresponded to clinical response. Quantified motility may be more useful than traditional scoring systems in PIBD.

Hepato-renal index on ultrasound in overweight children as non-invasive quantitative imaging biomarker

Virginie Frings¹, Judith Lubrecht¹, Kylie Karnebeek¹, Vera B. Schrauwen-Hinderling², Simon G.F. Robben³, Anita C.E. Vreudenhil¹

1. Department of Pediatrics, Centre for Overweight Adolescent and Children's Healthcare, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands;

2. Department of Imaging / Nutrition and Movement Sciences NUTRIM School of Nutrition and Translational Research in Metabolism Faculty of Health, Medicine and Life Sciences, 6229 ER Maastricht University, Maastricht, The Netherlands

3. Department of Radiology, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands

Background: Fatty liver disease is present in around 8% of children and increases up to 38% in children with obesity. Hepato-renal index (HRI) on ultrasound is a non-invasive and quantitative imaging biomarker which could detect and monitor non-alcoholic fatty liver disease (NAFLD) in children. In this study we analyzed HRI in children with overweight or obesity.

Methods: This prospective clinical monocenter study included patients <18 years old with overweight or obesity. Weight, height and age were recorded. Ultrasound of

the liver, with liver and kidney in one field of view, were analyzed to calculate HRI. A region of interest (ROI) of 908 pixels was placed in liver parenchyma without large blood vessels and was compared to an identical sized ROI in kidney cortex. The average of three measurements was taken as definite HRI. Magnetic resonance imaging (MRI) of liver was performed to determine liver steatosis and to exclude hepatic comorbidities.

Results: Twenty-one patients were included of which 15 patients had increased ALT of more than two times the upper limit of normal (>44 U/L for girls and >52 U/L for boys) plus liver steatosis on MRI. Median age was 15 year (IQR 12-15) and patients had a median BMI of 31.1 kg/m² (IQR 28.5-37.1), with a corresponding median BMI z-score of 3.4 (IQR 3.1-4.0). HRI was significantly higher in patients with increased ALT and liver steatosis on MRI with a mean HRI of 2.2, compared to unaffected patients with a mean HRI of 1.3 ($p=0.02$). Receiver operating characteristic curve showed an area under the curve of 0.92 to detect NAFLD with HRI with an optimal cut-off of 1.5 with a sensitivity of 93% and specificity of 83%.

Conclusions: HRI is significantly increased in patients with increased ALT and liver steatosis on MRI and could serve as non-invasive quantitative imaging biomarker in children with overweight or obesity to detect fatty liver disease. An optimal HRI cut-off value of 1.5 had a good sensitivity and specificity of 93% and 83% respectively.

Ultrasound shear-wave elastography and attenuation imaging compared to histology in pediatric patients

M. Zellner¹, R. Gnann¹, I. Altmann-Schneider¹, V. Spyropoulou², D. Lenggenhager³, C. J.

Kellenberger¹

1. University Children's Hospital Zurich, Radiology, Zurich, Switzerland,

2. University Children's Hospital Zurich, Gastroenterology, Zurich, Switzerland

3. University Hospital Zurich, Pathology, Zurich, Switzerland

Purpose: To gain experience with and evaluate the role of quantitative liver ultrasound for characterization of liver disease in children.

Material and Methods: In this ongoing study, shear wave elastography (kPa), shear wave dispersion slope [(m/s)/kHz] and attenuation imaging (dB/cm/MHz) measured with an 8MHz matrix convex array transducer (Aplio i800, Canon Medical System) are compared to clinically indicated liver biopsy. Since December 2021, quantitative US data have been compared to histology reports in 15 children (age 12.2 +/- 2.8 years, range 6.7 years to 16.7 years) with descriptive statistics.

Results: 13 out of 15 children with portal inflammation in liver biopsy showed an elevated dispersion slope above 12.5 [(m/s)/kHz]. 5 patients had increased attenuation (> 0.63 dB/cm/MHz) correlating to steatosis seen in the liver biopsy in 3 out of 5 children. One patient showed a steatohepatitis with increased attenuation (0.79 dB/cm/MHz) and dispersion (13 [(m/s)/kHz]). 6 children with elevated shear wave elastography showed either fibrosis or cirrhosis.

Conclusion: These preliminary data show that quantitative US imaging of the liver may predict inflammation, steatosis and fibrosis on histology of the liver. Further study is needed also for defining normal values of quantitative liver imaging in the pediatric population.

Is ASL MRI the new tool for reliable renal perfusion quantification? Study of quality and reliability of repeated measurements

Tijana Radovic^{1,2}, Milica M. Jankovic³, Mirjana Kostic², Brankica Spasojevic², Mirjana Cvetkovic², Ivana Gojkovic⁴, Polina Pavicevic^{1,2}

1. University Children's Hospital, Department of Radiology, Belgrade, Serbia

2. University of Belgrade, Faculty of Medicine, Belgrade, Serbia

3. University of Belgrade, School of Electrical Engineering, Department of Signals and Systems, Belgrade, Serbia

4. University Children's Hospital, Department of Nephrology, Dialysis and Transplantation, Belgrade, Serbia

Background: Measurement of renal perfusion is a crucial part of measuring kidney function since it represents a key determinant of glomerular filtration rate. Arterial spin labelling magnetic resonance imaging (ASL MRI) is a non-invasive method of measuring renal perfusion using arterial blood as endogenous contrast without the need for administration of exogenous compounds. Aim of our study was to determine the quality of perfusion measurements as well as the intra-visit and inter-visit reproducibility of ASL MRI method for perfusion estimation in pediatric and young adult renal allograft patients and individually matched healthy controls.

Methods: Renal perfusion exams were performed at 1.5Tesla MRI in a total of 40 subjects: 20 allograft patients (10 male, median age 15.5yrs.) for intra-visit reliability and 20 individually matched healthy controls for intra-visit measurements and inter-visit reproducibility on a separate day with at least 24h apart. Reliability of repeated measurements was estimated with intraclass correlation coefficient (ICC) and coefficient of variance (CV). To allow for quality assessment, relative perfusion-weighted signal (PWS) of parametric maps was calculated.

Results: Mean PWS value on parametric maps was $3.43 \pm 1.43\%$, with no significant difference between study groups ($p=0.101$). cRBF in the patient group ranged

between 85 and 335 mL/100 g/min, with a mean value of 190.05 ± 67.62 mL/100 g/min, while in the control group the mean cRBF value was 322.00 ± 121.36 ml/100gr/min. In addition, in allograft group, cRBF values of the whole kidney measured in all obtained slices (8) were compared to a single representative middle slice and the acquired results showed a highly significant correlation between the two values ($r=0.82$, $p=0.00004$) with no statistically significant difference in two different quantification approaches (whole kidney vs single representative slice mean values 173.78 ± 53.29 and 183 ± 61.66 ml/min/100gr, respectively, $p=0.319$) Overall intra-visit ICC varied between 0.91-0.99, while CV was 5.7%. while inter-visit measurements in healthy participants demonstrated slightly more variation with ICC of 0.86 (0.68-0.94) and CV of 13.4%.

Conclusion: ASL MRI at 1.5T provides a repeatable method of measuring renal perfusion in both allograft patients and healthy subjects without the need for administration of exogenous compounds.

Ovarian Torsion: Challenges in Sonographic-Surgical discordance

Anna Seehofnerova^{1,2}, Jayne Seekins¹, Stephanie Cizek³, Erika Rubesova¹

1. Department of Radiology, Stanford School of Medicine

2. Masaryk University Brno

3. Department of Obstetrics & Gynecology, Stanford School of Medicine

Objective: Adnexal torsion is one of the most common gynecological emergencies. It is caused by twisting of the ovarian vasculature due to anatomic differences such as longer uteroovarian ligament or secondary to an ovarian mass. Ultrasound is the modality of choice to detect torsion although definitive diagnosis is difficult despite various signs that have been described in the literature. The aim of our study was to evaluate patients with sonographic-surgical discordance and reasons for the discrepancy.

Materials & Methods: We retrospectively evaluated ultrasound examinations of patients (0-18yo) referred to our institution with suspicion of adnexal torsion between 2018 and 2023. From 1328 patients with pelvic ultrasound, we reviewed 41 cases with sonographic diagnosis of torsion, based on asymmetrical ovarian enlargement, stromal edema with peripheralization of follicles, decreased perfusion, or whirlpool sign. Presence of ovarian masses (solid or cystic) or other anomalies was recorded. Final diagnosis was based on surgical report, MRI, or clinical examination. Additionally, 9 cases with negative ultrasound had torsion diagnosed by MRI or surgically.

Results: 25/41 cases with sonographic diagnosis of torsion were confirmed intraoperatively. In the false positive group (16/41), the majority of ultrasounds (12/16) were remarkable

for the presence of an adnexal mass noted in surgery or MRI, which was not described by ultrasound in 8 cases due to small size, central position in the parenchyma, isoechogenicity, or lack of perfusion, and therefore demonstrating features of torsion.

8/9 patients with false negative sonographic diagnoses presented with large adnexal masses (>5 cm). One patient from this group had no adnexal mass, but symmetrical enlargement of ovaries was noted, without other signs of torsion. Torsion on the right side was proven intraoperatively.

Conclusion: Despite being the modality of choice for ovarian torsion detection, ultrasound diagnosis can be challenging. The presence of adnexal mass is a major obscuring factor. Patients with concomitant ovarian mass should be evaluated for additional sonographic findings of torsion such as whirlpool sign, and eventual imaging with MRI. Although ultrasound provides useful information, clinical symptoms should prevail for surgical decision-making.

Antibiotic Prophylaxis for Micturating Cystourethrography: Findings from a National Multidisciplinary Survey
Harsimran Laidlow-Singh¹, Kate Thomas², Susan C Shelmerdine³

1. Paediatric Radiology, Evelina London Children's Hospital, London UK

2. Department of Radiology, Royal Hospital for Children & Young People, Edinburgh UK

3. Great Ormond Street Hospital for Children, London UK

Background: Paediatric patients are referred to radiology departments for micturating cystourethrogram (MCUG) studies for a variety of reasons, usually in the investigation of recurrent/atypical urinary tract infection (UTI) or congenital anatomical abnormalities, such as posterior urethral valves. Due to risk of introducing exogenous infection, this procedure is performed with antibiotic cover, for which there is a robust evidence base, as well as national and local guidance. This study is designed to identify and characterise variations in practice between individuals and institutions across the United Kingdom.

Materials and Methods: Prospective multi-centre survey designed to capture behaviour and experience of multiple stakeholder professional groups including radiologists, radiographers, paediatric surgeons, and primary care doctors. Questions ascertaining knowledge and application of current best practice. **Results:** Knowledge of best practice for antibiotic use in MCUG studies is significantly varied amongst UK medical professionals, with variations correlating with professional group and region of practice. Not all paediatric patients are routinely given evidence based treatment for this investigation.

Conclusion: There is a wide variation in clinical practice regarding the provision of antibiotics for MCUG studies

including in prescribing, dispensing, and checking. A risk of patient harm arises from both underutilisation of antibiotics, in the form of higher rates of ascending UTI, and overutilisation, in the form of antibiotic related side effects and microbial resistance. Inappropriate practice also worsens resource efficiency by resulting in delayed and cancelled studies. Variation in practice should be minimised, initially by employment of robust local and national policy.

Comparison of superb microvascular imaging with Color and Power Doppler imaging in the evaluation of testicular vascularity with Doppler Ultrasound for determination of viability in undescended testes in children

Mustafa Faraşat¹, Mine Özkol Önoğlu¹

1. Turkish Society of Radiology

Purpose/Objective/Background: Evaluation of blood supply of undescended testicles (UT) and small-sized testicles is not always possible with traditional Doppler techniques. Superb Microvascular Imaging (SMI) is a new Doppler Ultrasound technique used to determine low velocity blood flow. SMI is available in two modes as color SMI (cSMI) and monochrome SMI (mSMI). In our study, we aimed to evaluate the effectiveness of SMI in demonstrating testicular blood flow and compare it with color Doppler (CD), power Doppler (PD) and Advanced Dynamic Flow (ADF).

Materials: Pediatric patients who applied for testicular ultrasound for any reason were evaluated in the study. Patients with hydrocele, testicular mass, inguinal and femoral hernia, and patients who could not be examined due to non-compliance were excluded from the study. 71 patients, 138 testicles were included in the study.

Methods: CD, PD, ADF, cSMI and mSMI Doppler images were obtained from the testicular hilum level. Visual scoring was used for blood flow assessment. Testicular borders were drawn manually on PD, ADF, cSMI and mSMI images and the vascularity index (VI) was calculated automatically by the ultrasound device. Patients were divided into 4 groups (0-12, 13-60, 61-120, 121-206 months) according to age, and ROC curve analysis was used to determine the normal testicular VI cut-off value.

Results: The mean age of the patients was 66 months (1-206 months). Of 138 testicles, 72 were intrascrotal, 63 were inguinal, and 3 were abdominal. The longest size and volume of ITs were smaller than normal testicles (NT), the difference was statistically significant ($p < 0.05$). In visual scoring, testicular blood flow detection rates were 50.7%, 76.1%, 70.3%, 94.9%, 95.7% in CD, PD, ADF, cSMI, mSMI, respectively. There was good agreement between the two readers in visual scoring ($\kappa = 71, 68, 79, 75, 76$). Mean VI values in NTs and ITs, respectively, were PDVI 4.76 ± 4.03 - 1.66 ± 2.02 , ADFVI 1.57 ± 1.34 - 0.92 ± 1.52 , cSMIVI 3.04 ± 2.12 - 1.45 ± 1.32 and mSMIVI 5.04 ± 3.46 - 2.51 ± 2.32 , the difference was

statistically significant ($p < 0.05$). mSMIVI cut-off value (sensitivity, specificity, and area under the curve) in groups 2, 3, and 4 were 1.85 (80%, 50%, 0.694), 2.4 (80%, 65%, 0.722), 3.75 (81%, 78%, 0.889) respectively. cSMIVI cut-off value in groups 1, 3, and 4 were 1.35 (87%, 58%, 0.714), 1.6 (75%, 59%, 0.704), 1, 4 (90%, 78%, 0.910). PDVI cut-off value in groups 1, 2 and 4 were 2.25 (81%, 65%, 0.750), 1.4 (80%, 58%, 0.781), 1.4 (95%, 78%, 0.942). ADFVI cut-off value in group 4 was 0.35 (100%, 78%, 0.910).

Conclusions: SMI is more sensitive than other Doppler techniques in detecting testicular blood flow, and we think that it should be a part of routine testicular vascular examination, especially in cases where blood flow is difficult to detect, such as in undescended testis. Studies with larger patient populations are needed for the accuracy of VI cut-off values.

Keywords: Color and power Doppler, Superb microvascular imaging, Undescended Testis, vascularity index

An optimised diagnostic imaging pathway for suspected renovascular hypertension in children

Rita Pina Prata¹, Dipalee Durve²

1. Rita Pina Prata - Radiology Department, Centro Hospitalar Universitário Lisboa Central; ESOR Fellow at Evelina London Children's Hospital

2. Dipalee Durve MRCPCF FRCP Consultant Paediatric Radiologist, Evelina London Children's Hospital

Purpose: Paediatric hypertension in children is increasing in prevalence and if untreated can lead to cardiovascular or end stage renal disease. A clear pathway that guides clinicians to select appropriate investigations is recommended. The authors propose a refined diagnostic imaging algorithm to image children with hypertension.

Methods: An algorithm was proposed using a literature review and our experience at the Evelina London Children's Hospital: Following a dedicated clinical assessment, B-mode ultrasound (MBUS) is suggested as a first-line approach unless there is a high clinical suspicion of renovascular disease, whereby they proceed directly to renal Doppler ultrasound (RDUS). MBUS aims to assess renal artery stenosis, aortic calibre, renal vein patency, renal length discrepancy or other causes of hypertension such chronic renal disease or a renal/suprarenal mass. RDUS assessment is recommended in patients with a high index of suspicion (as per ESPR Abdominal Imaging Task Force definitions) and in cases with a positive MBUS. Further imaging is performed accordingly and is included in the suggested algorithm.

Materials: The proposed algorithm was retrospectively tested on a database of 85 patients who were referred to a tertiary paediatric centre with hypertension.

Results: Seventy-five out of the patients underwent MBUS and 57 (67%) underwent RDUS. MBUS was considered positive in 6 out of 9 patients with confirmed renovascular

hypertension, representing a sensitivity of 67% (and specificity of 82%). RDUS was performed on 57 patients attaining a sensitivity of 67% and specificity of 82%. Using the suggested algorithm, only 33/85 (39%) of RDUS would have been performed instead (25 due to high clinical suspicion and 8 with B-mode ultrasound) and RDUS evaluation would not have been omitted in any patient. Appropriate selective advanced imaging assessment of the renal arteries was performed including 7 patients who underwent magnetic resonance or computed tomography angiography and 11 who underwent angiography.

Conclusion: In high risk patients for renovascular hypertension RDUS may be the appropriate initial test and may direct further work-up. However, MBUS may be sufficient in many patients with hypertension and may provide alternative diagnosis. Adequate patient selection would represent a decrease of 28% of RDUS performed.

Friday 9th 13:30h-15h

MSK and AI Session

Role of T2-weighted MR radiomics in the prediction of FOXO1 fusion-positive rhabdomyosarcoma

Adarsh Ghosh¹, Hailong Li¹, Alexander J. Towbin¹, Brian K. Turpin¹, Andrew T. Trout¹

1. Cincinnati Children's Hospital Medical Center

Objectives: Alveolar rhabdomyosarcomas are often associated with chromosomal translocations, which result in fusions of PAX3-FOXO1&PAX7-FOXO1. FOXO1-fusion is a significant negative prognostic factor in patients with localized disease, with an overall survival of 65% versus 88% for fusion-negative rhabdomyosarcomas. Unfortunately, molecular testing for the evaluation of FOXO1 fusion is time-consuming and is not available at the time of histological diagnosis.

Radiomics is a quantitative approach to imaging that extracts features from the image pixels. Studies in other tumours have shown that radiomic features can differentiate tumour subtypes. The purpose of this study is to evaluate the ability of T2-weighted MR radiomics to predict FOXO1 fusion-positive paediatric rhabdomyosarcoma.

Methods: Patients with rhabdomyosarcoma and baseline MR imaging were retrospectively identified. Radiomics models were developed using a training cohort and tested in a separate cohort with the same diagnosis. Whole tumour volumes-of-interest (VOIs) were segmented on T2-weighted images by a single reviewer. For each VOI, first-order histogram and second order radiomics features were extracted. Maximum relevance and minimum redundancy algorithm were applied for feature selection. Logistic regression and support vector machine (SVM)

were employed as the classifiers. Receiver operating characteristic (ROC) analysis was performed to evaluate the diagnostic performance of the classifiers on the test set.

Results: A total of 68 patients were included in the study. The radiomics model was developed in 52 subjects (median age (IQR) of 7 years (2–14 years); 34 females, 21 FOXO1-fusion positive) and tested in 16 patients (median age (IQR) of 4 years (2–13 years); 6 females, 4 FOXO1 fusion positive). The logistic regression and SVM models showed AUCs of 0.95 (95% CI: 0.89–1.0) and 0.96 (0.91–1.0) respectively on the training cohort. On the test cohort, the logistic regression model achieved an AUC of 0.83 (95% CI: 0.62–1.0) with a sensitivity of 83% (95% CI: 52–98%) and specificity of 100% (95% CI: 40–100%). The SVM model obtained similar performance on the external test set with an AUC of 0.83 (95% CI: 0.62–1.0).
Conclusion: T2-weighted MRI radiomics features can predict FOXO1-fusion in paediatric rhabdomyosarcomas. Future studies are needed to test the model on larger datasets and improve its performance.

Paediatric bone age estimation from lateral elbow radiographs using a machine learning-mediated approach

Alcide Alessandro Azzena¹, D. U. Pizzagalli², F. Del Grande^{1,2}, S. M. R. Rizzo^{1,2}, M. Wytenbach¹, M. B. Cipullo¹, S. Ghielmetti¹, M. C. Lacalamita¹, M. Palermo¹, S. Presilla³, L. Bellesi³

1. Istituto Imaging della Svizzera Italiana (IIMSI), Ente Ospedaliero Cantonale (EOC), Radiology, Lugano, Switzerland,

2. Università della Svizzera italiana (USI), Facoltà di scienze biomediche, Lugano, Switzerland,

3. Istituto Imaging della Svizzera Italiana (IIMSI), Ente Ospedaliero Cantonale (EOC), Servizio di Fisica Medica, Lugano, Switzerland

Purpose: To develop a machine learning-mediated approach to compute bone age from the lateral elbow radiograph in paediatric patients

Methods and Materials: Two-projections radiographs of the left elbow from 2013 to 2020 from 4 different hospitals were analyzed by five experienced radiologists who assigned bone age scores according to the Sauvegrain method (using two projections) and the Dimeglio method (using only the lateral projection). For both methods, the Olecranon Apophysis Score (OAS) was computed. This annotated dataset was used to train a machine learning-based system that computes OAS by solving a regression problem. Then, OAS was mapped to bone age using a polynomial interpolation of the curve presented in the Dimeglio method, tailored for girls and boys. A separate dataset, including the standard projections of the left elbow performed for bone age estimation in 2021, was selected

to validate the system. For this dataset, five reviewers scored the images using the Sauvegrain and Dimeglio method with the highest agreement to estimate bone age. To evaluate the accuracy of this dataset, the mean absolute error with respect to the manually annotated OAS and bone age was computed. The machine-learning approach was applied also to the validation dataset.

Results: The machine learning-mediated estimation of OAS showed a mean difference of 0.43 ± 0.17 points, compared to the OAS of the radiologist. This corresponded to a mean difference of 4 months compared to the Dimeglio method applied manually and 4.7 months compared to the Sauvegrain method.

Conclusion: The proposed machine learning-mediated determination of bone age was able to assign bone age with a negligible difference compared to the radiologists, thus helping to disambiguate cases not precisely falling into a pre-defined category.

Fully automated measurement of Cobb angle in coronal plane spine radiographs

Christoph Salzlechner^{3,#}, Christopher Lepenik³, Kenneth Chen^{1,2}, Daniel Ehinger³, Thomas Klestil^{1,2}, Stefan Nehrer², Richard Ljuhar³

1. Department for Orthopedics and Traumatology, Landesklinikum Baden-Mödling, Austria

2. Department for Health Sciences, Medicine and Research, University for Continuing Education Krems, Austria

3. ImageBiopsy Lab, Vienna, Austria

correspondence: c.salzlechner@imagebiopsy.com

Keywords: Adolescent idiopathic scoliosis, Cobb angle, spinal deformity, radiographs, artificial intelligence

Objective: Adolescent idiopathic scoliosis (AIS) is the most common form of scoliosis. It is a three-dimensional structural deformity with lateral and rotated curvature of the spine affecting adolescents from 10 to 16 years of age. The current standard method to assess scoliosis is the measurement of lateral curvature of the spine using the Cobb angle in coronal plane radiographs. The interobserver variability for Cobb angle measurements ranges to up to 8°. The purpose of this study was to test and validate the fully automated measurement of Cobb angles of an artificial intelligence (AI) model that was trained on more than 17,000 images.

Methods: Cobb angle measurements were performed on 44 AP/PA full spine radiographs of 44 patients with scoliosis (age: 17.3 ± 9.5 years [10, 58]; 29 female, 15 male). Images originated from four different radiography systems of three different manufacturers. A reference standard was established by determining valid spinal curvatures based on matching Cobb angle end vertebrae performed by four radiologists with more than five years of expertise in the measurement of quantitative spinal alignment parameters

on AP/PA full spine radiographs. For valid curvatures, the reference standard was defined as the median of the reader measurements. Independently, an AI-based software (IB Lab SQUIRREL) also performed Cobb angle measurements on the radiographs. AI performance was assessed by the mean difference and standard deviation of the differences compared to the reference standard, as well as the ICC. **Results:** Based on the Cobb angle end vertebrae selection of the readers, 48 curvatures remained for the reference standard. After comparing the end vertebrae of these curvatures to the AI outputs, 38 valid curvatures remained for performance assessment, corresponding to an accuracy of 79%. The mean difference and standard deviation of differences of Cobb angle measurements between the reference standard and the AI amounted to $-0.32^\circ \pm 4.75^\circ$, showing very low absolute bias. The ICC between the readers amounted to 0.93, while the ICC between the reference standard and the AI amounted to 0.91. **Conclusion:** The AI model showed good results in the determination of end vertebrae and excellent results in automated Cobb angle measurements compared to radiologists and could function as a reliable tool in clinical practice.

Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort

Johanna Pape¹, Franz Wolfgang Hirsch¹, Oliver Johannes Deffaa², Matthew D. DiFranco³, Maciej Rosolowski⁴, Daniel Gräfe¹

1. Department of Pediatric Radiology, University Hospital, Leipzig, Germany
2. Department of Pediatric Surgery, University Hospital, Leipzig, Germany
3. IB Lab GmbH, Vienna, Austria
4. Institute for Medical Informatics, Statistics and Epidemiology, Leipzig University, Leipzig, Germany

Declaration: Conflict of Interest: Matthew DiFranco is an employee of IB Lab GmbH. The other authors declare no conflicts of interest.

Background: Bone age (BA) determination based on the hand and wrist according to the 70-year-old atlas of Greulich and Pyle (G&P) is still commonly used in many institutions today. A more recently available approach based on artificial intelligence (AI) allows automated estimation of BA according to G&P. AI-based approaches are nevertheless limited for images deviating from standard hand and wrist projections. More generally, whether BA determined by G&P still corresponds to the chronological age (CA) of a contemporary German population is still a matter of debate. **Objective:** We aimed to determine the agreement of the AI software BA with a current healthy Leipzig collective.

In addition, we sought to assess the reliability of the AI software in a setting with slightly angled X-ray projections. **Materials and methods:** The AI software BA was retrospectively estimated in children who had received radiographs of one hand in the posterior-anterior and oblique planes to rule out osseous injuries. The prediction error of BA from CA was determined for each plane, as well as the prediction error of BA between the two planes. **Results:** 1254 patients (3 - 16 years, median 10.8 years, 55.7% male) were included. The mean error of BA in posterior-anterior projections to CA was $3.0 (\pm 13.7)$ months in boys and $1.7 (\pm 13.7)$ months in girls. Oblique projections had highly similar variation to CA (mean error 3.1, respective 0.3). **Conclusion:** The BA, as estimated by the AI software, is very close to the real age of the contemporary German population studied and is thus sufficiently accurate in a clinical context. The software provides robust results even for oblique projections.

Keywords: Children, Chronological Age, Bone age, Greulich Pyle, Artificial Intelligence

An initial approach of Artificial intelligence in pediatric brain segmentation and quantification using Magnetic Resonance Imaging

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Kousik Shankar², Robert P Raj³

1. Sri Devaraj Urs Academy of Higher Education and Research Tamka, Kolar, Karnataka-563103, India.
2. SVIAM, Bengaluru, Karnataka, India
3. SP hospital, Parassala, Thiruvananthapuram, kerala, India

Objectives:

- Voxel based analysis of pediatric MRI brain images with segmentation of images into various tissue component and reproducing the data.
- Newer fast technique for reproducing segmented and unsegmented images.
- Quantification of tissues in normal pediatric brain MR images.
- Neural network to build Artificial Intelligence in quantification of segmented and unsegmented images

Material and methods: Multicentric Retrospective and Prospective study of pediatric MRI brain. MR sequence used are 3DT1 or SPGR. Data are collected from different centers and processed for segmentation.

The technology stack consists of MATLAB, Python, MRIcroN, SPM, and dcm2niigui.

Technique: All the data set collected from different centers are stored and categorized age-wise. Each case study is processed in different software. Application of SPM and Matlab software to convert Nifti images into unsegmented and segmented Matlab figures. With the help of SPM: estimation and reviewing of results with paired t

tests. Quantification of brain tissues done using volumetric tools. Creating each individual brain atlases at different age groups among males and females. Our work focuses on using AI and Deep Learning to segment and quantify paediatric brain MRI. Our Voxel Based Morphometry-based method speeds up manual segmentation, saving time and money. This atlas can be used with existing SOTA methods as a large-scale dataset in the age of Big Data and ML.

Results:

- Deep learning and neural network in creating the smooth workflow of Voxel Based Morphometry.
- Reproduce unsegmented and segmented images in effective and quick method.
- Application: Identify abnormalities and quantify. As an important biomarker in future drug trials to assess treatment effects. 3D image printing. Software for detecting and quantifying normal and abnormal structures.
- Overall, our method accelerates the laborious and time-consuming segmentation process. Automated interpretation of results using Artificial intelligence.

Preferential involvement of the pelvis and hips along with active sacroiliitis in chronic nonbacterial osteomyelitis

Ercan Ayaz^{1,2}, Adalet Elçin Yıldız³, Ezgi Deniz Batu⁴, Yelda Bilginer⁵, Seza Özen⁶, Üstün Aydingöz⁷

1. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey
2. Diyarbakır Children's Hospital, Radiology Clinic
3. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey
4. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey
5. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey
6. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey
7. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey

Purpose: We aimed in this study to present MRI findings in a single-center cohort of patients with chronic nonbacterial osteomyelitis (CNO).

Methods: Three observers (two musculoskeletal radiologists and a pediatric radiologist) reviewed MRI findings in 74 patients (40 males, 34 females; age at onset, mean, 8.7 years; range, 2–17; age at diagnosis, mean, 10.3 years; range 3–18) with CNO, who were diagnosed with this condition over a period of 15 years. For every patient, sites of active osteitis at any time during the course of disease (at initial diagnosis or later follow-up) were noted. Temporal changes of lesions in response to treatment (or other treatment-related changes such as pamidronate lines) were

not within the scope of this study. Active sacroiliitis was defined as bone marrow edema or active osteitis subjacent to the iliac and/or sacral sides of sacroiliac joints.

Results: Whole-body (WB) MRI was performed in all but five patients (69/74; 93%) during the course of the disease; mostly following an initial targeted MRI (97%). A total of 289 targeted MRI (mean, 4.0; range, 1–11) and 168 WB-MRI (mean, 2.4; range, 1–8) were performed on the entire study group. Biopsy was made in 30 patients with sufficient material for histopathological diagnosis in all but one (39%), all consistent with CNO or featuring supporting findings. The most common locations for active osteitis were clustered into seven skeletal locations: 1 = pelvis (excluding sacrum and coccyx) and proximal 1/3 of femora (78%); 2 = sacrum and ilium immediately subjacent to sacroiliac joints (69%; active osteitis denoting “active sacroiliitis” here); 3 = distal legs (including distal 1/2 of tibias and fibulas, ankle or feet (66%); 4 = bones surrounding knees including distal 2/3 of femora and 1/2 of proximal tibias and fibulas (55%); 5 = sternum, clavicles, scapulae and mandible (49%); 6 = upper extremities (47%); and 7 = spine, excluding portions of sacrum subjacent to sacroiliac joints (45%). **Conclusion:** Bones at (i.e., sacrum and innominate bones) or around (i.e., proximal femora) pelvis were preferentially involved in our cohort of CNO patients with a marked presence of active sacroiliitis.

Diagnostic performance of an artificial intelligence aid for the detection of pediatric appendicular skeletal fractures

Altmann-Schneider I^{2,3}, Pistorius S^{2,3}, Saladin C^{2,3}, Schäfer D¹, Fischer H¹, Arslan N¹, Kellenberger CJ^{2,3}, Seiler M^{1,2}

1. Pediatric Emergency Department, University Children's Hospital Zurich, Zurich, Switzerland
2. Children's Research Center, University Children's Hospital Zurich, Zurich, Switzerland
3. Department of Diagnostic Imaging, University Children's Hospital Zurich, Zurich, Switzerland

Purpose: Artificial intelligence (AI) is a rapidly emerging concept, affecting the daily work of radiologists and clinicians. The development of AI tools for pediatric imaging lags behind that for adult imaging. Pediatric fracture detection is challenging compared to adults as fractures are often subtle or even nonvisible. Additionally, the fracture patterns change with the patient's age. This study aimed to evaluate the diagnostic performance of an AI tool for pediatric fracture detection in the three most common fracture locations of the pediatric appendicular skeleton, namely the forearm, elbow and lower leg.

Materials and Methods: Our study was approved by the institutional review board. From December 2021 backwards, consecutive patients aged 0 to 16 years with

suspected fractures and radiographs (frontal and lateral) of either the forearm, elbow or lower leg were included until approximately 1000 patients were reached for each location. All radiographs were read by two pediatric radiologists. BoneView's (Gleamer, Paris, France) diagnostic performance was evaluated using the pediatric radiologists' consensus reports as reference standard. Each long bone was analyzed as separate case. **Results:** This study included 966 patients with radiographs of the forearm (mean age 7.9 years, age range 0.5 – 16 years), 1030 patients with radiographs of the elbow (mean age 7.7 years, age range 0.5 – 16 years) and 1000 patients with radiographs of the lower leg (mean age 4.8 years, age range 0 – 15.5 years).

1111 forearm fractures were detected, of which 59.2% radial fractures and 40.8% ulnar fractures. BoneView sensitivity and specificity was 95.6% and 92.2% for radial fractures and 88.7% and 94.5% for ulnar fractures.

20% of the patients had an elbow fracture. BoneView sensitivity and specificity was 82.3% and 78.3% respectively. 558 lower leg fractures were detected, of which 19.5% fibular and 80.5% tibial fractures. BoneView sensitivity and specificity was 87.5% and 96.3% for fibular fractures and 84.4% and 98.4% for tibial fractures.

Conclusions: The diagnostic performance of BoneView for the automated detection of pediatric extremity fractures is promising for forearm and lower leg fractures. However, before implementation in the clinical routine the AI diagnostic performance needs to be improved especially for elbow fractures.

ZTE sequences with AI-based image reconstruction for 3D evaluation of the temporomandibular joint and craniofacial bones in children with juvenile idiopathic arthritis

N. Kocher¹, C. Kellenberger¹, M. Zellner¹, R. Kottke¹, S. Sirin¹

1. University Children's Hospital Zurich - Eleonore Foundation, Department of Diagnostic Imaging, Zurich, Switzerland

Purpose: In more than 50% of children with juvenile idiopathic arthritis (JIA) the temporomandibular joint (TMJ) is affected. TMJ arthritis can lead to growth disorders of the mandible, to facial deformities and to malocclusion with misalignment of the teeth. 3D reconstructions of the craniofacial bones are needed to evaluate these complications. MRI is the gold standard in detection of TMJ arthritis. But so far, bone structures are not sufficiently visualized by traditional MRI technology and often additional CT scans were performed to create 3D reconstructions. The aim of this study was to evaluate a novel zero echo time (ZTE) sequence with artificial intelligence (AI) based image reconstruction in the diagnosis of osseous changes in children with JIA.

Methods: 2D and 3D images from ZTE sequences reconstructed with deep learning algorithms, were evaluated by two independent experts for image quality (rated with 0-4 using a 5-point scale), for quantitative measurements and for detection of osseous pathologies of the jaws in comparison to images from established black bone sequences. Additionally, a morphometric 3D analysis of the mandible was conducted.

Materials: 42 patients with JIA underwent an MRI of the temporomandibular joints within a period of seven months. Two patients had to be excluded due to an incomplete examination, thus the scans of 40 patients (29 female, 11 male; age 9.5 +/- 3.7 years) were rated and statistically evaluated.

Results: 21 patients presented with active arthritis and 27 patients with postarthritic changes of the TMJ. No significant differences between ZTE and black bone imaging were found for image quality, quantitative measurement of the length of the ramus of the mandible, and detection of osseous pathologies. The 3D reconstruction and evaluation of the facial bones was successful in all patients, with 3D reconstruction of the ZTE sequences being much easier and faster than 3D reconstruction of black bone sequences.

Conclusions: ZTE sequences employing AI-based image reconstruction allow for excellent visualization of compact bone and 3D rendering of the facial bones. These MR techniques have the potential to fully replace CT scans for assessing facial bone pathology in children with JIA and TMJ arthritis.

Artificial intelligence-based image reconstruction of abdominal MRI in children

Vanda Pocepcova¹, Michael Zellner¹, Christian J. Kellenberger¹

1. University Children's Hospital Zurich

Purpose: To investigate image quality of abdominal magnetic resonance imaging (MRI) with artificial intelligence (AI) based image reconstruction.

Material and methods: In 21 children (mean age 6 years and 9 months, range 1 year and 7 months to 15 years and 10 months) undergoing abdominal MRI, including the lung base, on a 1.5 T scanner, axial T2-weighted and T1-weighted images employing radial k-space filling (PROPELLER) were evaluated for image quality. Signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of the liver and spleen were compared between images obtained by conventional and deep learning (DL) reconstruction methods, and between images obtained by conventional reconstruction in two successive examinations, whereas the latest examinations were acquired with increased imaging matrix and reduced number of excitations (NEX) in order to accelerate scan time. Subjective image quality was assessed by three observers using a 4-point Likert scale.

Results: Both T2-weighted and T1-weighted DL reconstructed images provided significantly higher SNR and CNR (Wilcoxon test, $p < 0.0001$). The T1-weighted images acquired in reduced scan time modus also showed significantly higher SNR (Wilcoxon test, $p < 0.001$) and higher CNR (Wilcoxon test, $p < 0.02$) compared to T1-weighted images from our standard settings. The ‘accelerated’ T2-weighted images showed equivocal results with moderately higher SNR and CNR ($p < 0.03$) for the spleen and no significant difference in SNR and CNR for the liver parenchyma.

The images with DL reconstruction showed less noise, reduced blurring of organ borders and sharper delineation of small structures such as subsegmental bronchi, subpleural lung vessels and intrahepatic vessels.

Conclusion: AI-based image reconstruction improves image quality of abdominal MRI with the potential to obtain higher spatial resolution and shorten imaging time.

Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DW-MRI) in tumoral and Non-tumoral pediatric Bone Marrow Diseases (BMD)

Tatiana Fazecas¹, Flavia Martins Costa¹, Clarissa Canela¹, Marcos Godinho¹

1. Clinica de Diagnostico por Imagem – CDPI, Dasa, Rio de Janeiro

Purpose:

- 1) Identify MR protocol used to analyses bone marrow in WB-DW-MRI owing to detect tumoral and non tumoral pathologies and differential diagnosis.
- 2) Know basic principals of DWI WBMRI and typical lesion appearances and awareness of potential pitfalls.
- 3) Make a pictorial essay of lesions that mimic bone marrow tumoral lesions including conventional MRI sequences , DIXON and DWI and understand the characteristic features which allow discrimination between them and true neoplasms in order to avoid unnecessary additional workup.
- 4) The usefulness of DWI whole-body MR in diagnostic algorithms of tumoral and non-tumoral disorders including differentiate diagnosis as inflammatory, infectious and pseudotumoral conditions.

Methods and materials: Exams were performed in 1.5 (Avanto- Siemens) and 3.0 (Prisma-Siemens)Tesla machines with different protocols according with clinical indications, between January of 2015 from January of 2023 in pediatric patients in clinica de diagnostico por imagem (CDPI) in Rio de janeiro-Brasil.

Results:

Different pathologies were diagnosed:

Oncological (lymphoma, neurofibromatosis, rhabdomyosarcoma, Li-Fraumeni Syndrome)

Inflammatory (Chronic recurrent multifocal osteomyelitis, Juvenil idiopathic arthritis)

Myopathies (Dermatomyositis)

Infectious (Sars-Covid arthritis, tuberculosis, syphilis)

Hereditary (multiple enchondromatosis, vascular malformation)

Conclusion: WB-DW-MRI is a sensitive method for imaging without ionising radiation that can provide WB coverage with a core protocol of high soft tissue contrast and spatial resolution in a short time, useful in detecting and characterising tumoral and non-tumoral BMD, evaluating their response to therapy and in screening of high-risk cancer patients. It is a reliable alternative to conventional imaging for diagnosis, staging and monitoring skeletal cancer, due to radiation free in follow-up examinations.

Poster Abstracts

Artificial Intelligence

Using AI to improve the ultrasound experience in paediatric patients

Dr Brenna McInerney¹

1. The Grange University Hospital, NHS Wales

Introduction: Ultrasound scans can be a daunting experience for children, especially if they don't know what to expect. Providing personalised leaflets or letters to children about their upcoming scan can help alleviate their fears and anxiety. However, tailoring these letters to different age groups can be a time-consuming and costly process. We aim to explore the potential benefits of using AI to personalise letters about ultrasound scans for children.

Methods: We propose to use AI to generate age-tailored letters about ultrasound scans for children. The system will use natural language processing and machine learning algorithms to generate letters that are tailored to each child's age group. We discuss the potential pros and cons, and hypothesise the benefits of conducting a pilot study to evaluate the effectiveness of these personalised letters in reducing anxiety and improving overall satisfaction with the scan experience for both the clinician and patient.

Conclusion: Using AI to tailor letters about ultrasound scans for children has the potential to improve the overall experience of the scan and reduce anxiety in children. This approach is cost-effective and scalable, making it a valuable addition to paediatric healthcare services. If successful, this project could be expanded to other healthcare settings and patient populations. Further research is needed to explore the effectiveness of this approach in different contexts.

Identification and segmentation of neuroblastoma after chemotherapy with an Artificial Intelligence solution

Diana Veiga-Canuto¹, Leonor Cerdà-Alberich¹, Cinta Sangüesa Nebot¹, Luis Martí Bonmati¹

1. Grupo de Investigación Biomédica en Imagen, Instituto de Investigación Sanitaria La Fe, Avenida Fernando Abril Martorell, 106 Torre A 7planta, 46026 Valencia, Spain

Purpose/Objective/Background: To assess the accuracy of a fully automatic nnU-Net CNN algorithm to identify and segment primary neuroblastoma tumors in T2 weighted MR images in children after chemotherapy.

Methods: An international, multicentric, and multivendor imaging repository of patients from different European institutions with neuroblastic tumors was used to validate the performance of a previously trained tool based on the nnU-Net architecture, to identify and delineate primary neuroblastoma tumors after first treatment with chemotherapy.

Materials: A dataset of 535 MR T2/T2* weighted sequences was selected (486 sequences at diagnosis and 49 after chemotherapy). Neuroblastic tumors were automatically segmented using a previously trained nnU-Net architecture. The automatic segmentation masks were manually edited by an expert pediatric radiologist and the DICE Similarity Coefficient, Jaccard index, Hausdorff Distance, AUC ROC and the modified false positive rate and false negative rate were used to compare success (the automatic with the manually edited masks).

Results: The median DICE obtained from the comparison of the automatically obtained masks with the masks resulting after a manual edition after treatment was 0.902, slightly lower compared to the median DICE at diagnosis without chemotherapy (0.999). There was no statistical difference between these results. Most (68%, n=33/49) cases after chemotherapy were successfully segmented by the AI solution, with a DICE>0.8. A 33% (n=16/49) of the cases showed a DICE<0.8, and among them, complete failure was observed in 7 cases (14%, DSC<0.19). The factors that influenced the lower outcomes after chemotherapy were a smaller mean volume and a lower voxel signal intensity of tumors after treatment.

Conclusions: This is the first study to validate an automatic identification and segmentation model for post-chemotherapy neuroblastic tumor with MR. This automatic nnU-Net tool is able to locate and segment neuroblastic tumors on T2/T2* weighted MR images after treatment, with a median DICE after treatment of 0.902.

Evaluations of Compressed SENSE combined with Deep Learning Reconstruction in ACR Phantom and Porcine Spine MR Image

Dong Jwo KIM, RT¹, Eunju Kim, Ph.D.¹, SangWoong Park, RT¹, KyungSeong Lee, RT¹, HongUk Gu, RT¹, Myungju Cho, RT¹

1. Seoul National University Hospital Radiology Eunju Kim, Ph.D.: Health Systems, Philips Korea

Purpose: The artifacts such as pulsation and motion can lead to modulation of the k-space data in Spine MR Image. Fast MR imaging techniques such as parallel imaging and/or compressed sensing can ameliorate

the motion-related artifacts, consequently improving image quality. However, high acceleration factor to further reduce scan time can deteriorate image quality with undersampling-related artifacts. Recently, a novel method for integrating artificial intelligence (AI) into compressed SENSE (i.e., compressed sensing + SENSE) reconstruction (CS-SENSE AI) has been introduced for significantly reducing scan time as well as noise artifacts. In this work, we aimed to demonstrate the utility of CS-SENSE AI in spine MRI before translating it into clinical practices.

Methods: All MR examinations were conducted using 3 T MR scanner (Ingenia CX, Philips Healthcare, The Netherlands) with dStream anterior-posterior coil. We first tested CS-SENSE AI reconstruction algorithm in ACR MRI phantom. Imaging parameters for CS-SENSE AI were as follow: TR/TE = 3950/100, FOV = 200 × 200, in-plane resolution = 400 × 400, CS-SENSE factor = 2, acquisition time = 2 min 14 s. The CS-SENSE AI reconstruction algorithm was further evaluated with porcine spine *ex vivo*. The cervical, thoracic, and lumbar regions of *ex vivo* porcine spine was scanned in axial and sagittal directions using the same sequences used for scanning ACR phantom. For qualitative and quantitative evaluations, two radiologists evaluated the image quality in terms of sharpness, presence of artifacts, and SNR on a 5-point Likert scale and compared with the images acquired with conventional MR sequences without accelerations.

Results: In both ACR phantom and *ex vivo* porcine spine scans, CS-SENSE AI reconstructions significantly reduced scan times with comparable image quality obtained with conventional MR sequences without accelerations. Moreover, CS-SENSE AI reconstruction improved the image contrast by removing noise and showed better visualization of spinal cord and vertebrae in porcine spine. The inter-observer agreement ranged from substantial to near perfect.

Conclusion: The CS-SENSE AI reconstruction clearly demonstrated the ability of reducing noise artifacts and provided better image quality at accelerated acquisition time, suggesting that it would be promising technique in spine MRI examination.

Clinical Usefulness of Accelerated Deep Learning-Based MRI in Pediatric Patients with Hand Injury with a splint

Gun Young Kim¹, Hong Wook Gu¹

1. Seoul National University Hospital, Radiology

Purpose: The purpose of this research is to evaluate clinical usefulness of deep learning based TSE(TSE_{DL}) denoising technique for MRI of hand injury pediatric patients wearing a splint before surgery.

Methods: MRI protocol, accelerated the deep learning based TSE (TSE_{DL}) and the standard TSE (TSE_C) sequences for axial T2 WI, coronal T1 WI, and coronal T2 WI were scanned for comparison. For the quantitative evaluation,

two radio technologist with more than 5 year of experience determined three regions of interest, such as bone, fat, and muscle, to obtain signal intensity, and obtained the standard deviation of noise in four image background to calculate and compare SNR and CNR.

For the qualitative evaluation, five valuation items of SNR, Image Contrast, Sharpness, Artifact, and DIQ were evaluated with a 5 point score. Compared to TSE_{DL} and TSE_S.

Materials: MRI examination were performed using a 3.0 Tesla MRI scanner (Magnetom SkyraFit, Siemens Healthcare, Erlangen, Germany) with two sets of 30-channel body coils (Body 30, A 3T Tim coil, Siemens Healthcare GmbH, Germany), and used chicken legs instead of the human and phantom.

Results: Scanning time is reduced by approximately half for the TSE_{DL} compared to TSE_S. TSE_{DL} showed significantly better SNR, CNR than TSE_S for all sequences ($p < 0.05$). For qualitative analysis, TSE_{DL} are shown to be significantly superior to TSE_S for both readers in terms of image quality and diagnostic reliability ($p < 0.05$). In this study, the reliability between evaluators was mostly almost perfectly consistent.

Conclusions: In conclusion, it was found that TSE_{DL} is a clinically very useful test by reducing the scan time and improving the image quality compared to TSE_S.

Cardiac

CT image of Eisenmenger syndrome in patient with VSD and PDA - what happens when they grow up

Aleksandar Pavlović¹, Tarik Plojović¹, Bojana Mišković¹, Ksenija Mijović¹, Ljubica Sedlar¹, Katarina Lazerević¹, Dragan Vasin¹, Dragan Mašulović¹

1. Center of Radiology, University Clinical Center of Serbia, Belgrade, Serbia

Background: Congenital anomalies, especially if the symptoms are uncontrolled, can result in specific syndromes in adulthood. Eisenmenger syndrome can occur as a complication of uncorrected high-pressure congenital heart defects with large anatomic shunts.

Methods: We are presenting a case report of a 50-year-old male patient with Down syndrome and confirmed ventricular septal defect (VSD) and patent ductus arteriosus (PDA), as well as severe pulmonary hypertension, complaining of hemoptysis.

Materials: After a chest X-ray in the supine position, which showed an enlarged heart and parahilar consolidation, CT pulmonary angiography was done, followed by an echocardiogram.

Results: CT showed VSD and PDA, while contrast saturation dynamics in heart chambers and large blood vessels revealed a reversal of the shunt resulting in a right-to-left shunt. The right ventricle was larger than the left, with the

hypertrophic wall, while there was no contrast medium in the left atrium. A pericardial effusion was also seen.

Diffuse confluent zones of ground-glass opacification were shown in all lung lobes with a basal predominance, with foci of consolidation and a smaller amount of content in the bronchial tree. The CT findings demonstrated alveolar hemorrhage as part of the Eisenmenger syndrome. Echocardiogram confirmed our findings.

Conclusions: Congenital heart defects with large anatomic shunts can lead to the Eisenmenger syndrome, presenting with signs of pulmonary arterial hypertension and shunt reversal, which can be clearly confirmed by CT.

Right-sided cervical aortic arch in Loeys–Dietz syndrome

Behnam Shakerian¹, Negin Razavi¹

1. Cardiovascular surgery department, Kashani Hospital, Shahrekord University of Medical Sciences, Shahrekord, Iran

Loeys–Dietz syndrome is an autosomal dominant connective tissue disorder that is characterized by skeletal abnormalities, craniofacial malformations, and predisposition for aortic aneurysm with tortuosity. We report a case of a right-sided cervical aortic arch associated with the Loeys–Dietz syndrome.

Case report: A 13-year-old girl presented complaining of a pulsatile mass on the right side of her neck since birth, which had gradually increased in size. On physical examination, she had a short stature, there was a pulsatile swelling on the right side of the neck. Cardiac examination was normal. Examination of her head and face revealed an abnormal cranial structure consistent with hypertelorism, retrognathia, and low-set ears, and inspection of her oral cavity showed a bifid uvula and a high arched palate. Skeleton findings included scoliosis and joint laxity. Chest X-ray showed the absence of a normal aortic knob. Computed tomography angiography revealed a right-sided cervical aortic arch. The patient underwent surgical reconstruction.

Discussion: In 2005, Loeys et al. characterized a newly identified genetic syndrome by a triad of hypertelorism, cleft palate or bifid uvula, and arterial tortuosity or aneurysm. Other manifestations include blue sclera, scoliosis, retrognathia, craniosynostosis, pectus deformity, joint laxity, velvety skin, congenital heart defect, and mild developmental delay.

A cervical aortic arch is a rare vascular anomaly. The prevalence of a cervical aortic arch is less than 1 in 10,000 live births. The cervical aortic arch is often asymptomatic or presents as a pulsatile neck mass, dysphagia, dyspnea, discrepancy of arterial blood pressure between the upper and lower extremities, cough, hoarseness, and mild stroke.

Myocardial dystrophic calcifications in children: A case series

Karen I. Ramirez-Suarez¹, Monica Miranda-Schaeubinger¹, Joseph A. Stern¹, Mariangeles Medina Perez¹, Jordan Rapp^{1,2}, David Biko^{1,2}, Hansel J. Otero^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA, USA.

2. Perelman School of Medicine at The University of Pennsylvania, Philadelphia, PA, USA.

Background: Dystrophic calcification of the myocardium is a rare condition that may develop as a complication of several critical illnesses. The pathophysiology of this condition is poorly understood, and the underlying mechanisms and clinical manifestations may differ between etiologies. Various imaging modalities are used to detect and characterize myocardial calcifications, including chest radiography, echocardiography, CT, and MRI. Our goal is to describe the clinical and imaging findings of eight children with dystrophic myocardial calcifications.

Methods & Materials: In this retrospective study, approved by our Institutional Review Board, we reviewed echocardiography and CT images of children with myocardial calcifications from 2000 to 2022. All CT images were evaluated and compared to echocardiography findings. Clinical information including diagnosis, comorbidities, and treatment was extracted from patients' medical records.

Results: Eight patients, 5 (62.5%) boys, with a median age of 2.9 years [IQR 0.87 - 9.65] were included. All patients had CT imaging and echocardiography. All CT images demonstrated myocardial calcifications, only visualized on echocardiography in three patients (37.5%). The time gap between CT images and echocardiography ranged from 0 to 16 days. Calcification distribution varied from confined to the right ventricle to the entire myocardium. Five patients (62.5%) had a previous cardiac transplant, one of whom also received extracorporeal membrane oxygenation (ECMO). Of the three patients without heart transplant, two patients (25%) had sepsis. One required ECMO and one other (12.5%) had sepsis, liver failure, and required dialysis due to renal failure. The last patient required ECMO after cardiac arrest.

Conclusions: Patients with sepsis, renal failure, ECMO, and heart transplant may develop myocardial calcifications. Calcifications are more likely to be seen with CT than echocardiography. Further research is needed to better understand the pathophysiology of these conditions and how they relate to patient outcomes.

Diagnostic role of cardiac magnetic resonance in children and young adults with structurally normal heart and ventricular arrhythmia

Maja Bijelić¹, Andrija Pavlović¹, Tamara Ilisić¹, Ida Jovanović², Goran Vukomanović¹, Vojislav Parezanović^{1,3}, Igor Stefanović^{1,3}, Jasna Kalanj^{1,3}, Stefan Đorđević⁴, Mirko Topalović⁵, Irena Oštrić Pavlović⁶, Maja Trkulja¹, Marko Pavlović¹, Vlade Živković¹, Milan Đukić^{1,3}

1. Cardiology department, University Children's Hospital, Belgrade, Serbia;

2. BioCell Hospital, Belgrade, Serbia;

3. University of Belgrade, Faculty of Medicine, Belgrade, Serbia;

4. Rheumatology department, University Children's Hospital, Belgrade, Serbia;

5. Department of Pediatric Cardiology, University Medical Centre Children's Hospital Ljubljana, Ljubljana, Slovenia;

6. Clinical allergology and immunology, University Clinical Center of Serbia, Belgrade, Serbia;

Background: Although ventricular arrhythmia (VA) in children and young adults with structurally normal heart is rare, when present, it warrants careful diagnostic evaluation for underlying cardiac disease.

Purpose: Our aim was two-fold: 1) to assess the prevalence of cardiac magnetic resonance (CMR) abnormalities, and 2) to determine independent predictors of CMR abnormalities in children and young adults with structurally normal heart and VA of unknown cause.

Materials: 116 patients (median age 17 years, age range 8 to 44 years) from an electronic registry of a high-volume university center, with VA and normal echocardiographic finding, underwent CMR (1.5 Tesla) with late gadolinium enhancement (LGE) during 2015-2022. Patients with acute myocarditis were excluded.

Methods: Binary logistic regression was used to determine independent predictors of pathological CMR finding.

Results: Abnormal CMR finding was present in 45% (n=52). In our cohort, 57% (n=66) of patients were asymptomatic. Mean premature ventricular complex (PVC) burden was 18.04±17.44%. Both non-sustained ventricular tachycardia (VT) and sustained VT were present in 17% (n=20), respectively. Strongest predictors associated with CMR abnormalities in univariate analysis were exercise-related symptoms (odds ratio (OR) 3.93, 95% confidence interval (CI): 1.29-11.91, p=0.015), PVC burden >15% (OR 3.40, 95% CI: 1.32-8.7, p=0.011) and right ventricle dilation as assessed by echocardiography (OR 1.85, 95% CI: 1.30-19.15, p=0.027). After multivariate analysis, exercise-related symptoms (OR 7.83, 95% CI: 1.91-32.09, p=0.004) and

PVC burden >15% (OR 4.74, 95% CI: 1.55-14.54, $p=0.006$) remained strongly associated with CMR abnormalities. There was no statistically significant association between abnormal exercise stress test, PVC morphology and CMR findings.

Conclusion: Abnormal CMR findings were present in almost half of our patients, with VA and previously structurally normal heart. Exercise-related symptoms and PVC burden >15% were significantly associated with abnormal CMR finding.

Cardiovascular magnetic resonance mapping parameters for advanced tissue characterization in hypertrophic cardiomyopathy

M. Ibnoukhatib¹, L. Riaza Martin¹, JM. Escudero¹, M. Gonzalo Carballés¹, L. Riera Soler¹, A. Sabate Rotes¹, F. Gran Ipiña¹, E. Vázquez Mendez¹

1. Hospital Vall d'Hebron. Barcelona /ES.

Background/Objective: Hypertrophic cardiomyopathy (HCM) is a myocardial disease transmitted as an autosomal-dominant mutation at high frequency and with a varying clinical presentation. Histological features of HMC include myocyte hypertrophy and interstitial fibrosis. These modifications of extracellular space are correlated to systolic and diastolic dysfunction and prognosis of the patient. Early detection of these changes is important for starting early therapy in patients with a major risk factor for sudden cardiac death.

T1 and T2 mapping is an established cardiovascular magnetic resonance (CMR) technique for quantitative tissue characterization. The clinical relevance of T1 and T2 mapping for risk stratification of HCM has not been confirmed. The objective of this study is to learn the potential of multiparametric MRI in heart tissue characterisation in patients with HCM and to discuss the future directions of parametric mapping as a prognostic factor.

Methods: We performed a single center retrospective analysis from 2017 to 2023. 36 patients with HCM and 36 healthy patients were enrolled in this study. All subjects underwent cardiac MRI at 1.5 T. Myocardial maps were obtained in the short axis plane at the base, mid-ventricular and apex using single-breath-hold, ECG-triggered and MOLLI sequence. Myocardial segments were categorized as normal (control group), non-hypertrophic (HCM group) and hypertrophic (HCM group). We studied the difference among these three groups of T1 and T2 mapping, ECV, late gadolinium enhancement, and its correlation with left ventricle function and cardiac mass.

Results: Native T1 and T2 values were significantly elevated in both non-hypertrophic and hypertrophic segments of HCM patients compared to controls with significantly higher values in hypertrophic segments. There is also a positive

correlation between mappings parameters and positive LGE, left ventricular function and cardiac mass.

Conclusions: CMR mapping parameters in HCM allows comprehensive myocardial tissue characterization and can be used as an integral part in risk stratification. The findings suggest that alteration of mapping parameters occurs earlier than morphological changes and functional alteration. There is also a positive correlation between mappings parameters and cardiac mass.

Clinical PARAMETERS OF RESPIRATORY STATUS IN NICUs – IS THERE A ROLE FOR LUNG ULTRASOUND?

Mirjana Petković¹, Jovan Lovrenski¹, Aleksandra Doronjski¹, Slobodan Spasojević¹

1. Institute for Child and Youth Health Care of Vojvodina, Novi Sad, Serbia

OBJECTIVE: To assay the interconnection between LUS and chest X ray (CXR) and clinical parameters of respiratory status (FiO₂, PCO₂ and SaO₂) in pretermes. To investigate the possibility of LUS and CXR in detection of subpleural consolidations. To determine whether LUS can be of clinical benefit in assessing the effects of therapy.

MATERIAL AND METHODS: Prospective study included 100 premature neonates who underwent a CXR exam after the admission in the Neonatal intensive care unit (NICU). LUS was performed after admission in each neonate and after each successive CXR. A total of 382 LUS exams were done. Pearson correlation coefficient was used to test the interconnection between LUS and clinical parameters of respiratory status in pretermes on mechanical ventilation (MV) and on oxygen therapy (OxTh) – total number of LUSs in patients on MV and OxTh was 277 and 105 respectively. The number of consolidations seen on LUS and CXR was counted and compared between two diagnostic modalities. The p value <0.05 and the confidence interval (CI) of 95% were considered statistically significant.

RESULTS: Statistically significant correlation ($p<0.001$) was established between clinical parameters of respiratory status and LUS both in pretermes on MV and OxTh. In pretermes on MV the percentage of concurrence of LUS with FiO₂, PCO₂ and SaO₂ was 81%, 80% and 80% respectively, while concurrence of LUS with all three clinical parameters was 68%. In pretermes on OxTh, the percentage of concurrence of LUS with FiO₂, PCO₂ and SaO₂ was 94%, 96% and 93% respectively, while concurrence of LUS with all three clinical parameters was 85%. The mean number of subpleural consolidations detected by LUS per exam was 0.80. The mean number of consolidations detected on each CXR was 0.25. In 29% of preterm infants consolidations were detected both with LUS and CXR, in 71% only by LUS.

CONCLUSION: Statistically significant interconnection between LUS and clinical parameters of respiratory status (FiO₂, PaCO₂ and SaO₂) existed in both groups of pretermatures (MV and OxTh). LUS was more accurate than CXR in detecting subpleural consolidations. LUS can be useful in following-up the effects of administered therapy in NICUs.

Delayed Myocardial Enhancement in children: Comparison of conventional technique to a dark blood imaging technique in Duchenne Muscular Dystrophy

Sahana Rajesh¹, Marc Lee², Judd Storrs³, Simon Lee³, Rajesh Krishnamurthy³, Lamy Atweh⁴

1. Undergraduate Student, The Ohio State University. Columbus, Ohio, USA

2. The Ohio State University, Columbus, Ohio, USA

3. Department of Radiology, Nationwide Children's Hospital. Columbus, Ohio, USA

4. Heart Center, Nationwide Children's Hospital. Columbus, Ohio, USA

Background: Delayed myocardial enhancement (DE) is a well-established method to assess myocardial fibrosis. In pediatrics, conventional inversion recovery technique is the gold standard for assessing DME, and is a breath-held, bright-blood technique, with scarred myocardium enhancing similarly to blood pool. Utilizing dark-blood imaging (DBI) improves visualization of scarring by suppressing signal from the blood pool. It is also a free-breathing technique, using short inversion time, which may reduce motion artifact in children or patients who cannot breath-hold. Our aim is to compare this DBI sequence in patients with Duchenne Muscular Dystrophy (DMD) to the conventional DE technique.

Methods: Cardiac MRI studies from 27 consecutive patients (July–September 2022) with DMD were retrospectively analyzed. Subjects were scanned with conventional DE and DBI sequences in the short-axis plane, 8–10 minutes after contrast. Quantitative assessment was performed with regions of interest drawn in the blood pool, myocardium, scar, liver, and spleen. Image quality was assessed by two readers using a scoring system (1=non-diagnostic, 2=diagnostic, 3=excellent). The qualities assessed were overall visualization of scar, visualization of blood pool, visualization of myocardium, and motion related blurring. Wilcoxon Rank-sum tests were used to compare the two sequences.

Results: Our population had a mean age of 17 years (SD=8), average BSA of 1.5 (SD of 0.3), average HR of 91 bpm (SD=18), and average LVEF=53% (SD=5.8). Scar vs myocardium intensity ratio increased 6.14% for DBI acquisitions ($p<0.003$). DBI exhibited comparable image quality in three categories (blood pool, myocardium, scar visualization) with a medium rating of 3 for both readers with no statistically significant difference. DBI performed better than

conventional DE with motion related blurring ($p<0.01$) with median rating for conventional DE being 2.5, and DBI being 3. The overall ratings presented a statistically significant difference ($p<0.05$) with the conventional DE median being 2.5, and the DBI being 2.75.

Conclusions: When compared to the conventional DBE sequence, DBI shows improved visualization of myocardial scar by suppressing blood pool signal and provides comparable imaging quality while providing improved motion correction with the advantage of removing constraints of breath-holding.

Chest

Primary cavitating tuberculosis in an 8-month-old infant

Ognesoska B¹, Dimitrijevic K², Pashoska M¹, Stojovska Jovanovska E¹, Petrovski A¹

1. PHI University Institute for Radiology Skopje, Republic of North Macedonia

2. PHI University Clinic for Pulmonology and Allergology Skopje, Republic of North Macedonia

Cystic and cavitary lung lesions in infants can be indicative of a range of underlying conditions, including primary cavitating tuberculosis and congenital pulmonary airway malformation (CPAM). In an 8-month-old infant presenting with these symptoms, a thorough clinical evaluation is necessary to identify the underlying cause of the lesions.

The radiological findings of advanced primary tuberculosis in an 8-month-old infant may include infiltrates, consolidation, cavitations and lymphadenopathy. However, these findings are not specific to tuberculosis and can also be seen in other conditions such as congenital pulmonary airway malformation when complicated with infection.

CPAM is a congenital lung anomaly that results from an abnormality in lung development. The radiological features of CPAM include a cystic lesion in the lung, typically with well-defined margins and air-fluid levels, but it can contain only air.

Distinguishing between advanced primary tuberculosis and CPAM can be challenging, as both conditions can have similar radiological findings. However, other clinical features such as fever, cough, weight loss, and positive tuberculosis tests can help in the diagnosis of tuberculosis. In contrast, CPAM is typically asymptomatic and may be detected incidentally on routine imaging.

In summary, advanced primary tuberculosis in an 8-month-old infant can present with radiological findings that overlap with those of CPAM when complicated with infection. Tuberculosis in infants may present with unusual clinical and radiologic findings, and primary cavitary tuberculosis can also be seen in this age group. However, a careful evaluation

of clinical features, radiographic imaging and appropriate diagnostic tests can help in distinguishing between these two conditions.

Keywords: infants, cavity, tuberculosis, CPAM

Pediatric Tuberculosis: From Head to Toe

Elazir Di Puglia¹, Tatiana Fazecas¹, Claudia Penna¹, Miriam Porto¹, Bianca Guedes¹, Bianca Niremberg¹, Taisa Guarilha¹, Luiza Nahoum¹, Thiaago Duarte-Torres¹

1. Hospital Municipal Jesus (HMJ) DASA

Introduction: Tuberculosis (TB) is a major worldwide health issue caused by the *Micobacterium tuberculosis* complex, which may affect various parts of the body and a wide range of age groups. When it comes to tuberculosis in children, the diagnosis may be radiologically suggested through the presence of hilar and mediastinal lymph node enlargement, a miliary pattern and a slow developing pneumonia.

There are two possible outcomes from a primary TB infection: the disease may enter a state of latency or it may progress to a primary disease. Once in its latent form, it can be reactivated and present in the form of pulmonary, extrapulmonary or disseminated TB. The primary complex, typical of the primary infection, is characterized by a pulmonary nodule and lymph node enlargement with caseous central necrosis. The latent infection, in which there are no clinical symptoms, is defined by the presence of the Ghon complex, a pulmonary focus in association to a calcified hilar lymph node.

The purpose of this project is to describe the pulmonary and systemic findings of pediatric tuberculosis.

Materials and methods: We selected nine cases of confirmed tuberculosis in a population of pediatric patients with ages ranging from 2 months to 14 years old who were hospitalized in the Hospital Jesus, in Rio de Janeiro, Brazil.

Results: From the nine selected patients, one presented with a primary pulmonary complex and two with a progressive primary form of the disease. Both of these patients had complications: one developed pericardial effusion and the other cavitary pulmonary consolidations.

Five patients presented with the primary form of TB with hematogenous dissemination, leading not only to the involvement of the lungs, through the formation of random non-confluent micronodules, but also the spread of the disease to other systems such as the large intestines, the bones and articulations. Another patient developed the secondary form, with a pulmonary reactivation of the disease.

Conclusions: Radiological imaging plays an important role in the diagnosis and management of TB and, when paired with a correct assessment of the clinical setting, it leads to better care for the patient.

Pleuroparenchymal fibroelastosis after hematopoietic stem cell transplantation; report of a two cases

Gozde Ozer¹, H. Nursun Ozcan¹, Berna Oguz¹, Mithat Haliloglu¹

1. Hacettepe University Faculty of Medicine, Pediatric Radiology Department

Background: Pleuroparenchymal fibroelastosis (PPFE) is a rare interstitial pneumonia characterized by interstitial pulmonary fibrosis of the upper lobes. It can be idiopathic, but has also been found to be associated with hematopoietic stem cell transplant (HSCT), lung transplant, chemotherapy, dust exposure, and infections. PPFE is characterized by elastic fibrosis of the upper lobes involving the pleura and subpleural parenchyma, and the definitive diagnosis is made by histopathological confirmation. Because of biopsy complications such as persistent postoperative pneumothorax and acute exacerbation, clinical and radiological diagnostic criteria for PPFE have been proposed to diagnose this entity without biopsy. Recent studies have shown PPFE may be underdiagnosed in children with a history of HSCT, leading to a delay in treatment and unnecessary lung biopsies. We aimed to present two patients who developed PPFE after bone marrow transplantation.

Case 1: 10-year-old girl underwent allogeneic HSCT due to thalassemia major at the age of 5. Platelet engraftment developed after HSCT and treated with immunosuppressive agents. Fifteen months after the HSCT, the patient presented with a dry cough. The chest computed tomography (CT) showed pleural and septal thickening with parenchymal bands in both upper lobes. The wedge biopsy from the right lung upper lobe was compatible with PPFE.

Case 2: The patient was diagnosed with neuroblastoma at the age of 5, then developed secondary acute myeloid leukemia when he was nine years old. He was treated with allogeneic HSCT. After four years, he presented with cough and dyspnea. The chest CT showed pleural thickening, atelectasis, and traction bronchiectasis in both upper lobes. Clinical and radiological findings were found to be compatible with PPFE at the multidisciplinary medical team meeting.

Conclusion: PPFE can develop as a lethal long-term pulmonary complication following HSCT in children. Therefore, familiarity with the clinical and radiological findings of PPFE is important for diagnosis, as lung biopsy may not be indicated in patients with characteristic findings on chest CT.

Invasive Group A Streptococcus - a pictorial review: How can radiologists help to guide clinicians' management?

Dr Harriet Edwards¹, Ms Emma Morton¹

1. Alder Hey Children's Hospital, Liverpool, UK

Background: Invasive Group A Streptococcal (GAS) infection in children has recently increased in the UK, assumed exacerbated by reduced socialising during Covid-19

lockdowns. The complexity of this infection, with rapid clinical deterioration, has led to challenging multidisciplinary discussions in our tertiary centre Intensive Care Unit (ICU). We reviewed our patient cases and the involvement of radiology to help guide the future education and management of this pathology.

Methods: Imaging, laboratory results and clinical notes of patients admitted to the paediatric ICU over a three-month period were reviewed by a radiologist and ICU nurse practitioner, with focus on imaging and its impact on subsequent clinical management.

Findings: Twelve patients aged 4 months to 15 years were admitted to the ICU between September and December 2022, all with non-specific symptoms and rapid clinical deterioration. Nine patients had severe lung consolidation, lobar collapse or empyemas with GAS confirmed from pleural fluid, endotracheal tube aspirates or throat swabs. Two patients had intracranial subdural empyemas with complicated cerebral abscess or infarction, and GAS confirmed on surgical aspirates. One node biopsy-confirmed case presented with widespread lymphadenopathy. Further complications included venous and arterial thrombi, multi-organ failure, pulmonary haemorrhage, organomegaly, limb ischaemia and bowel ileus.

Learning Points: Radiology played an influential role in the management of this patient group, predominantly using bedside ultrasound to assess vascular and lung pathologies, and radiographs to confirm lung effusions and collapse. The rapid and portable access of these investigations were invaluable to those too unstable to leave the ICU. MRI aided management of subdural collections and cerebral abscesses, with whole body skeletal surveys performed to identify infective foci. CT was used for initial intracranial presentations and guided management of thoracic pathologies.

Conclusion: Multi-modality imaging in invasive GAS patients enabled rapid management of complex and very unwell children. Patterns of radiological pathologies focused our use of portable chest ultrasound in unstable patients on our ICU, with all other modalities playing a role in assessment of the added complications found in these children, educating us for future cases.

Patient rotation on neonatal chest X-rays: determination, direction and misinterpretation

Jani Marais, MBChB¹, Shyam Sunder B Venkatakrishna, MBBS², Juan S Calle-Toro, MD³, Pierre Goussard, PhD⁴ Savvas Andronikou, MBBCh, PhD, FRCR (Lon), FCRad (Diag)⁵

1. Groote Schuur Hospital, Cape Town, Western Cape, South Africa

2. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, USA

3. Department of Radiology, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA

4. Department of Pediatrics and Child Health, Faculty of Medicine and Health Sciences, Tygerberg Hospital, Stellenbosch University, Cape Town, South Africa

5. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, USA

Paediatric chest X-rays are routine for neonates, especially in the ICU. Patient rotation is an important determinant of quality which can cause misinterpretation.

Purpose: This educational exhibit will demonstrate the consequences of rotation on neonatal chest radiographs and how these affect diagnosis. In addition, we will demonstrate methods for determining the presence and direction of rotation.

Background: Patient rotation is common in chest x-rays of neonates, because they are unable to follow instructions and are often moving. Rotation is present in over half of chest x-rays from the ICU, contributed to by unwillingness of technologists to reposition newborns for fear of dislodging lines and tubes. Rotation is often unavoidable and therefore requires vigilance on the part of the interpreting radiologist/neonatologist to avoid misinterpretation or masking of significant findings. The six main effects of rotation on supine paediatric chest x-rays: 1) unilateral hyperlucency of the side that the patient is rotated towards; 2) the side 'up' appears larger; 3) apparent deviation of the cardiomeastinal shadow in the direction that the chest is rotated towards; 4) apparent cardiomegaly; 5) distorted cardio-mediastinal configuration and 6) reversed position of the tips of the umbilical artery and vein catheters with rotation to the left. These effects can cause diagnostic errors due to misinterpretation, including air-trapping, atelectasis, cardiomegaly, and pleural effusions, or disease may be masked. There is no universal method for evaluating rotation in children. It is accepted that the clavicles should NOT be used in contrast to adult chest x-rays. Instead, it should be assessed by the measurement and comparison of the length of anterior or posterior ribs on both sides of the thorax. This educational exhibit will demonstrate this method of evaluating rotation with examples, including a 3D model of the bony thorax as a guide. In addition, multiple examples of the effects of rotation will be provided including examples where disease was misinterpreted, underestimated or masked.

Conclusion: Rotation is often unavoidable in neonatal chest x-rays, especially in the ICU. It is therefore important for physicians to recognise rotation, and its effects, and to be aware that it can mimic or mask disease.

High-resolution chest CT in children with severe asthma

Federica de Matteis¹, M. S. Prevedoni Gorone², M. de Filippo², A. Licari², L. Preda²

1. IRCCS ICS Maugeri Pavia

2. IRCCS Policlinico San Matteo Pavia

Purpose or Learning Objective: To identify with the usage of HRCT biomarkers and diagnostic radiological equipment, variables able to predict the severity of asthma.

Methods or Background: We analysed CT data from 20 school-aged children (6–17 years) both males and females, with a confirmed diagnosis of severe asthma according to GINA guidelines, and 21 control school-aged children referred to our Pediatric Clinic who were prescribed a chest CT on a motivated clinical indication different from asthma. The following CT parameters were evaluated: total lung volume (TLV), mean lung density (MLD), airway wall thickness (AWT), a percentage of airway wall thickness (AWT%), BA ratio, bronchiectasis grading (BG) and severity (BS), Emphysema, Mosaic lung attenuation and mucus plugging's (MP). HRCT data were correlated to the following clinical parameters: forced expiratory volume in 1s (FEV1), forced vital capacity (FVC), forced expiratory flow at 25–75% (FEF25–75%), FEV1/FVC ratio, fractional exhaled nitric oxide (FeNO) and serum IgE level.

Results or Findings: The radiological findings that we highlighted to be significantly associated with the severe asthma were BT scores ($p < 0.001$; they were always 0 in the control group), AWT% ($p < 0.001$), BG and BS scores ($p = 0.016$), mucus plugging and centrilobular emphysema ($p = 0.009$). The AWT% had the highest interdependence, followed by BT scores and Centrilobular emphysema. In relation to the AWT% four subgroups have been identified.

Sensitivity, specificity, and overall accuracy of this classifier were 95%.

Conclusion: Utilizing HRCT throughout qualitative and quantitative evaluations of the parenchyma bronchial structures, we were able to identify radiological markers that can predict the severity of asthma. Particularly, a seclusion of AWT% (≥ 38.6) was identified as a discriminant against pediatric patients with severe asthma from controls.

Limitations: It is a monocentric retrospective study, and the sample size was limited. It was not possible to quantify the air trapping, because expiratory scans were not at the time of examination. The limited patient number due to CT imaging in children is not risk-free, and although the future cancer risk associated with low-level radiation (associated with CT) is not certain, expert panels agree that there is a small cancer risk that increases with increasing dose.

Blunt traumatic diaphragmatic hernia in a teenage boy: A case report

Nevena Lazović¹, Dušan Banovac¹, Zorica Joković¹

1. Radiology Department, University Children's Hospital, Belgrade, Serbia

Background: Traumatic diaphragmatic hernia (TDH) is rare in the pediatric population, occurring in less than 1% of all traumas in children. The most often cause of TDH is blunt trauma that happens, in more than half of cases, 68.4%, during road accidents. Different studies show a male prevalence; the median age is about 7 years old. A left-sided hernia is more common than a right-sided one, primarily due to the protective effect of the liver. Objective of our study is to demonstrate a case of blunt TDH in a teenage boy.

Case report: After a road accident, a 15-year-old boy presented in the hospital with pain in his left shoulder and hip. In physical examination, the patient had few excoriations and two cuttings in the region of the left hemithorax. Initial chest X-ray was without signs of fracture or pneumothorax. Furthermore, the abdominal ultrasound showed no traumatic lesions of the parenchymal organs or free fluid in the abdominal cavity. The patient was discharged for home treatment. During the next four months, the patient came to the hospital several times because of epigastric pain, usually after a meal, nausea and episodes of vomiting, but without clear and convincing clinical signs of acute surgical disease. Finally, he was kept in the hospital for diagnosis. The abdominal X-ray showed no signs of pneumoperitoneum and ileus, but an elevated left hemidiaphragm without a precise contour. Upper gastrointestinal series were performed and showed mesenteroaxial gastric volvulus with a highly suspicious intrathoracic position of gastric corpus and left colic flexure. Computed tomography was done the same day and confirmed the suspicion of TDH with positive signs such as dependent viscera sign, intrathoracic herniation of abdominal contents, and elevated abdominal organs (stomach, small bowel loops and left colic flexure were visualized in the left hemithorax, 9 cm above the dome of the right hemidiaphragm). Abdominal organ repositioning and diaphragm primary repair were performed immediately after diagnosis.

Conclusions: TDH is rare in pediatric age with life-threatening complications and can be easily overlooked, so it's essential to have a high clinical index of suspicion after blunt thoracoabdominal trauma.

Lung involvement in pediatric rheumatic diseases; an elephant in the room of the rheumatology clinic

Spyridon Prountzos¹, Sofoklis Antonakis¹, Melanthi Tsikna¹, Argyro Mazioti¹, Fotis Lampros², Efthymia Alexopoulou¹

1. 2nd Department of Radiology, National and Kapodistrian University of Athens, University General Hospital "Attikon"

2. Rheumatology Unit, 3rd Department of Pediatrics, National and Kapodistrian University of Athens, University General Hospital "Attikon"

Purpose: This study aimed to describe the computed tomography (CT) findings of pulmonary involvement in children with rheumatic diseases.

Methods & Materials: Rheumatic diseases involve abnormalities of multiple organs and systems, but it is predominantly the musculoskeletal system that is affected. This retrospective study included 15 children (13 females and 2 males) with a median age of 14 years, who attended the Pediatric Rheumatology Unit of our hospital between 01/01/2021 and 01/01/2023. The spectrum of rheumatic diseases included 4 children diagnosed with systemic lupus erythematosus (SLE), 2 with systemic sclerosis, 2 with juvenile dermatomyositis, 2 with juvenile idiopathic arthritis (JIA), 2 with a mixed connective tissue disorder, and 1 with ANCA-positive vasculitis, 1 with granulomatosis with polyangiitis and 1 with Raynaud syndrome. Children had no history of chronic lung disease prior to the diagnosis of the rheumatic disease, and those with concomitant lower respiratory tract infections were excluded. Common indications for reference to our department were dyspnoea, cough, and early fatigue during exercise. All patients underwent a chest CT examination using a paired end-inspiratory/ forced-expiratory scan protocol using 1mm collimation and slice thickness reconstruction algorithm.

Results: We examined the presence of parenchymal opacities, ground-glass opacities, reticular pattern, honeycombing and parenchymal bands, bronchiectasis, and peribronchial wall thickening. Air trapping was assessed during expiratory scans. One-third of the patients (33%) showed parenchymal opacities, reticular pattern, and parenchymal bands. Two-thirds (60%) had ground-glass opacities. The vast majority (86%) presented with peribronchial wall thickening of varying degrees, while almost half (47%) of the patients had bronchiectasis. Only one patient showed honeycombing. Half (53%) of the patients showed air-trapping in the form of mosaic attenuation during expiratory scans.

Conclusion: To summarize, mild or even almost absent clinical symptoms, such as dyspnoea, cough, or early fatigue during exercise may reveal extensive findings of pulmonary alterations. Limitations of this study such as the retrospective nature and the relatively small group of patients point that further analyses need to be carried out in order to correlate radiological data better with clinical data, such as treatment regimes, and lung function tests.

References:

1. Richardson AE, Warriar K, Vyas H. Respiratory complications of the rheumatological diseases in childhood. *Arch Dis Child*. 2016 Aug;101(8):752-8. doi: 10.1136/archdischild2014-306049. Epub 2016 Jan 14. PMID: 26768831.

2. Rigante D, Cantarini L, Imazio M, Lucherini OM, Sacco E, Galeazzi M, Brizi MG, Brucato A. Autoinflammatory diseases and cardiovascular manifestations. *Ann Med*. 2011 Aug;43(5):341-6. doi: 10.3109/07853890.2010.547212. Epub 2011 Feb 1. PMID: 21284530.

3. Tarantino, G. Esposito, S. Andreozzi, L. Bracci, B. D'Errico, F. Rigante, D. Lung Involvement in Children with Hereditary Autoinflammatory Disorders. *Int. J. Mol. Sci*. 2016, 17, 2111. <https://doi.org/10.3390/ijms17122111>

4. Ramphul M, Gallagher K, Warriar K, Jagani S, Bhatt JM. Why is a paediatric respiratory specialist integral to the paediatric rheumatology clinic? *Breathe (Sheff)*. 2020 Dec;16(4):200212. doi: 10.1183/20734735.0212-2020. PMID: 33447294; PMCID: PMC7792836.

5. Assayag D, Kaduri S, Hudson M, Hirsch A, Baron M (2012) High Resolution Computed Tomography Scoring Systems for Evaluating Interstitial Lung Disease in Systemic Sclerosis Patients. *Rheumatology S1:003*. doi:10.4172/2161-1149.S1-003

6. Ruano, C. A., Lucas, R. N., Leal, C. I., Lourenço, J., Pinheiro, S., Fernandes, O., & Figueiredo, L. (2015). Thoracic Manifestations of Connective Tissue Diseases. *Current Problems in Diagnostic Radiology*, 44(1), 47-59. <https://doi.org/10.1067/j.cpradiol.2014.07.002>

7. Crestani, B. (2005), The respiratory system in connective tissue disorders. *Allergy*, 60: 715-734. <https://doi.org/10.1111/j.1398-9995.2005.00761.x>

Congenital Tracheal Stenosis: The Role of Radiology in Diagnosis and Management

Sunit Davda¹, Samantha Chippington¹

1. Department of Paediatric Interventional Radiology, Great Ormond Street Hospital, London, UK

Background: Congenital tracheal stenosis is a rare, but life-threatening condition that can cause respiratory distress in infants and children. It is characterised by complete cartilage rings of trachea without the normal membranous portion. Those with respiratory distress often require surgical intervention for which radiology plays a vital role. Various imaging modalities are used to assess the extent and severity of the stenosis and workup prior to surgery as well as the immediate post-operative period and longer term follow up. In children where the post-operative course is more challenging, radiologists can play a role both in the diagnosis and management through interventional techniques.

Methods: Our educational poster presents a summary of the clinical and radiologic evaluation of congenital tracheal stenosis, including the use of various types of CT, bronchoscopy, bronchography and Optical Coherence Tomography. The poster also discusses interventional radiology techniques, such as balloon dilation and stent placement to help treat these patients in the post-operative course.

Results: The poster presents multimodality images that illustrate the imaging findings of congenital tracheal stenosis, including common associations (e.g. congenital cardiac anomalies). It demonstrates the importance of a multidisciplinary approach involving radiologists, ENT, intensive care, respiratory, cardiology and thoracic surgeons in the management of this condition.

Conclusion: Our poster provides a comprehensive overview of the role of radiology in the diagnosis and management of congenital tracheal stenosis. It highlights the importance of early recognition and prompt management to prevent respiratory distress and improve long-term outcomes. The poster aims to enhance awareness and understanding of this rare but potentially life-threatening condition amongst both general and paediatric radiologists, as well as the wider clinical team.

Pre-operative CT assessment of Congenital Chest Wall Deformities

Vera Brazão Carvalho¹, Pedro Riesenberger¹, Eduardo Bandeira¹, Ana Nunes¹, Eugénia Soares¹

1. Hospital Dona Estefânia - Centro Hospitalar Universitário Lisboa Central

Introduction/Objectives: Chest wall deformities are a set of congenital diseases that include a broad spectrum of disorders. To assess severity and to determine whether repair surgery is needed, different indexes are extracted from computed tomography (CT) images. We aim to illustrate key imaging features that allow differentiation of these pathologies and to present a sample structured report with the main indexes to be obtained for each type of deformity.

Material and methods: Bibliographic review and retrospective evaluation of chest CT from candidate patients for correction procedures in our paediatric university hospital.

Results: There is a large and diverse group of congenital abnormalities of the thorax that manifest as deformities and/or defects of the anterior chest wall. These anomalies vary by age at presentation, signs and symptoms, as well as evaluation and subsequent surgical treatment. Pectus excavatum is by far the most common congenital chest wall deformity characterized by sternal depression, whose severity is evaluated by extracting three main indices (Haller index, correction index and asymmetry index). Other disorders described in this work are pectus carinatum, pectus arcuatum (also known as Currarino-Silverman syndrome), Poland syndrome, sternal clefts and ectopia cordis, that are not necessarily evaluated using the same indexes. We highlight imaging features that can predict worst outcomes or affect therapeutic decision.

Conclusion: Knowledge of the pre-operative radiologic considerations and appropriate indexes is essential in providing appropriate imaging support to the surgeons performing correction procedures treated by surgery or non-operative methods.

CT and Dose

Less is more: the efficacy of single phase vs. multiple phase pediatric CT trauma protocols.

Rami Shaheen¹, Ruth Cyttar Kuint², Elena Zharkov³, Egal Frank⁴, Aner Keinan⁵

1. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

2. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel Faculty of medicine, The Hebrew university of Jerusalem, Jerusalem, Israel

3. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

4. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

5. Pediatric surgery department, Shaare Zedek Medical Center, Jerusalem, Israel

Background: Trauma is a leading cause of morbidity and mortality in children. CT is the study of choice for evaluating trauma patients and single scan techniques are becoming more common.

Materials and Methods: A retrospective analysis of all pediatric (ages 0-18 years) trauma cases who underwent abdominal CT, between 01/7/2017-31/12/2022, in Shaare Zedek Medical Center, Jerusalem, Israel.

Patient scanning protocol was chosen according to the relevant protocols at the time of the trauma, and depending on the referring service (adult vs. pediatric emergency department). It was either multiple scan protocol (MSP) (early arterial and portal-venous phase) or single scan protocol (SSP) (delayed arterial phase (DAP) or split bolus injection (SPI)). Further scans were added, if required. The efficacy of the SSP group was estimated by the need of additional studies.

Results: 480 cases were reviewed, 105 females and 375 males. 184 had MSP and 296 had SSP (276 SPI, 20 DAP). In the SSP group, patients were younger (11.15 ± 4.56 year vs. 15.00 ± 4.03 , $P < 0.001$). The clinical parameters at admission (hemodynamic stability, intubation, GCS) were similar in both groups.

In the MSP group, 174 out of 184 patients (94.6%) had two scans, nine had three scans and one had four scans. In the SSP group 251 out of 296 patients (84.8%) had a single scan, 44 patients had two scans and one patient had three scans ($p < 0.001$). The average number of scans per patient in the MSP group was 2.06 vs. 1.2 in the SSP group.

Stab wounds ($p = 0.008$, CI 1.9-89.32) gun shots ($p = 0.014$, CI 1.48-34.43) and additional findings in added scans ($p = 0.014$, CI 1.69-102.48) were predictors of the need for further investigation regardless of initial study protocol.

In a single case in the SSP-SPI group, bleeding from a pseudoaneurysm was discovered a week later.

Conclusions: Our study shows that use of SSP resulted in fewer scans per patient with similar efficacy compared with MSP in pediatric trauma. Case management was not influenced by the protocol used.

Fetal

Fetal MRI: Experience in Uruguay

Carlos Carnelli¹, Ana Parodi²

1. Asst Professor Radiology, Hospital de Clínicas, Universidad de la República, Montevideo, Uruguay.

2. Hospital de Clínicas, Universidad de la República, Montevideo, Uruguay

Backgrounds&Objectives: Fetal magnetic resonance imaging (FMRI) is a valuable complementary technique to prenatal ultrasound, useful in the detection and characterization of abnormalities of fetal development. The objective of this work is to describe the experience in the implementation of fetal magnetic resonance imaging in our hospital in the period between January 2021 and December 2021.

Methods: A descriptive, observational and retrospective study was carried out. The 30 FMR requested and stored in the PACS system from January 2021 to December 2021, performed at the Hospital de Clinicas, UdelaR, university hospital Imaging Service, were analyzed. Studies were performed with suspicion of thoracic, abdominal, osteoarticular or neurological pathology. All studies had a previous ultrasound (US) performed by qualified professionals.

Materials: The studies were done in the morning, with the patient fasting, in a Siemens Magnetom Avanto 1.5 Tesla machine using SSFSE (HASTE), SS (TrueFISP) and T1(SS-SPE) sequences. Scopolamine butylbromide 20mg e/v was administered. Gadolinium was not administered. The studies were interpreted by an Assistant Professor with experience in FMR. Demographic and clinical characteristics were evaluated, including age, weeks of gestation, type of pregnancy (single or multiple), pathologies found, concordance with ultrasound, and changes in treatment.

Results: All patients had an indication for MRI due to a pathology previously discovered on ultrasound, determine associated complications, classify severity, provide pre- and postpartum counseling, establish prognosis, and assess possible prenatal treatments. The study was well tolerated by the patients. Only one study was interrupted due to uterine contractions but nevertheless images obtained were of diagnostic quality.

Conclusions: MRI is useful in fetal diagnosis, providing sufficient information to act safely to gynecologists, neonatologists and pediatricians. It is not a method for the routine control of pregnancy, but it is considered the complementary study to be carried out when fetal pathology is suspected.

A pictorial review of non-cardiac thoracic abnormalities in fetal MRI

Pedro Riesenberger¹, Vera Brazão Carvalho¹, Ana Forjaco¹, Rita Carneiro¹, Eugénia Soares¹

1. Hospital de Dona Estefânia - Centro Hospitalar Universitário de Lisboa Central

Introduction and objective: Fetal thoracic anomalies comprise a group of pathologic entities with different etiologies and outcomes. We aim to provide a pictorial review of the most common fetal chest pathologies studied with Magnetic Resonance Imaging (MRI), excluding cardiac abnormalities.

Material and methods: Topic review based on bibliographical research and selection of case images from a paediatric university hospital. Whenever possible imaging findings are correlated with post-natal imaging, clinical data and/or autopsy results.

Results: The most common fetal thoracic abnormalities studied with MRI comprise congenital diaphragmatic hernia, congenital pulmonary airway malformation and bronchopulmonary sequestration. Owing to its soft-tissue contrast and spatial resolution, MRI has established its role as an important adjunct to ultrasound on the study of fetal thoracic malformations, and has been shown to yield additional information to that provided by ultrasound. MRI findings can impact both the diagnosis, allowing the distinction between the main pathologic entities, and the prognosis, predicting the risk of pulmonary hypoplasia or other adverse clinical outcomes. Key imaging findings that allow the distinction between thoracic abnormalities and estimation of unfavourable outcomes are addressed and revised.

Conclusions: Fetal MRI is a valuable imaging tool on the study of fetal thoracic abnormalities and there are key imaging features that can guide the radiologist in the differential diagnosis and the prediction of adverse clinical outcomes.

Additive manufacturing models of fetuses built from three-dimensional ultrasound, magnetic resonance imaging and computed tomography scan data

Heron Werner¹, Tatiana Fazecas¹, Pedro Castro¹, Flavia Paiva¹

1. Biodesing Lab Dasa /Puc - Rio

Objective: To generate physical fetal models using images obtained by three-dimensional ultrasonography (3DUS), magnetic resonance imaging (MRI) and, in some cases, computed tomography (CT) to guide additive manufacturing technology.

Methods: Images from 48 pregnant women, including 7 sets of twins, were used. Scans were performed using high-resolution 3DUS. In cases of abnormalities, MRI and CT, were

performed on the same day as 3DUS. The images obtained with 3DUS, MRI or CT were exported to a workstation in DICOM format. A single observer performed slice-by-slice manual segmentation using a digital high-definition screen. Software that converts medical images into numerical models was used to construct virtual 3D models, which were physically made using additive manufacturing technologies.

Results: Physical models based upon 3DUS, MRI and CT were successfully generated. They were similar to the postnatal appearance of the aborted fetus or newborns, especially in cases with pathology.

Conclusion: The use of 3DUS, MRI and CT may improve our understanding of fetal anatomical characteristics, and these technologies can be used for educational purposes and as a method for parents to visualize their unborn baby. The images can be segmented and applied separately or combined to construct 3D virtual and physical models.

Imaging of fetal abdomen – single center experience

Stokanovic Vesna¹, Laban Nikola¹, Mitić Dragan², Mladenovic Sanja¹, Milan Stefanovic^{3,4}

1. Center for radiology, University clinical center Niš, Serbia

2. Radiology department, General Hospital Pirot, Serbia

3. Obstetrics and Gynecology Clinic, University clinical center Niš, Serbia

4. Faculty of Medicine, University of Nis, Serbia

Contact: vstokanovic@gmail.com

Purpose/Objective/Background: MRI exam of fetal abdomen is a useful tool in evaluation of wide range of pathology affecting abdominal organs. It contributes to accurate diagnosis and prognosis of fetal conditions. Objective was to present our experience and findings from MRI exams of fetal abdomen.

Methods: We retrospectively reviewed all fetal MR exams performed on 3T GE Signa Pioneer MR machine at our institution during a period of three years. There were 53 fetal MRI exams in total from which seventeen cases aimed at fetal body imaging were selected and included in this study. We present our findings of various fetal abdomen pathology and its typical MR features.

Materials: All MR exams were indicated by gynecologist after ultrasound exam on which anomaly was seen or suspected. MR exams were performed without sedation, using various T2W, T1W and diffusion weighted (DWI) sequences. Gestational age of the fetuses at the time of the exam was between 21 weeks and 35 weeks.

Results: Most frequent pathology found were abdominal cysts. All five were found in female fetuses and four were ovarian cysts, and one was intestinal duplication cyst. Due to the size of the cysts, they were surgically removed after birth, and the diagnosis was confirmed.

We found hydronephrosis of various degree in four fetuses and two diaphragmatic hernias. MRI exam enabled us to visualize the size of the diaphragmatic hernias, which organs were displaced and to assess the size of the lungs.

Other pathology found were ascites, anal atresia, omphalocele, thoracic cyst.

In two cases based on US exam esophageal atresia and choledochal cyst were suspected, but MRI exam showed no anomalies, which was later confirmed on postnatal exam.

Conclusion: MR imaging is a complimentary diagnostic modality which enables us to confirm visualized or suspected anomaly on US exam and to characterize it more precisely. Additional information which MRI provides help differentiate lethal and non-lethal conditions, subsequently guiding the pregnancy management. Prenatal diagnosis facilitates parent counseling and planning of the delivery in an adequately equipped medical center to avoid unnecessary transportation of the baby after birth.

Gastrointestinal

MR Enterography in Pediatric Inflammatory Bowel Disease: Is the Inter-rater Agreement Better After Use of Single- or Evenly Split-dose Buscopan?

Jelenković Aleksandar¹, Koprivšek K¹, Bogdanović B¹, Simić D¹, Milak G¹, Stojšić M¹, Jojkić-Pavkov D¹, Tošić J¹

1. Radiology Department, Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, 21000 Novi Sad, Serbia

Background: MR enterography (MRE) is increasingly used for non-invasive assessment of intestinal inflammation in pediatric patients with inflammatory bowel disease (IBD). In order to obtain the high quality MRE images, the administration of spasmolytic agents (most commonly Buscopan) is obligatory. Data about the mode of Buscopan administration in pediatric patients with IBD is sparse and contradictory. The purpose of our study was to determine if administering an evenly split-dose of Buscopan would impact the inter-rater agreement, relative to the standard single dose.

Materials and Methods: We retrospectively evaluated a total of 112 MRE scans of children with IBD, examined with standard MRE protocol, at our MR unit between 2021-2023. In 90/112 patients MRE was performed with single-dose of Buscopan and in 22/112 with evenly split-dose (first dose administered after CINE study and the second before obtaining postcontrast images). Two general radiologists, with near-equal experience, evaluated MRE independently for both groups. The inter-rater agreement in detection of bowel wall inflammation, between the groups, on DWI, postcontrast studies and for final radiologist's reports, was assessed using the chance-corrected Cohen-kappa (κ) coefficient.

Results: Poor inter-rater agreement on presence of bowel wall inflammation was seen in the group where MRE was performed with single dose of Buscopan in all evaluated categories: DWI ($\kappa=0.018$, $p=0.743$), postcontrast studies ($\kappa=0.184$, $p=0.007$) and final radiologist's report ($\kappa=0.164$, $p<0.001$). In the group where MRE was performed with evenly split-dose Buscopan, substantial inter-rater agreement was found on DWI images ($\kappa=0.605$, $p=0.000$) and fair-to-moderate inter-rater agreement on both postcontrast images ($\kappa=0.384$, $p=0.007$) and on final radiologist's reports ($\kappa=0.348$, $p=0.000$).

Conclusions: Our results suggest that application of evenly split-dose Buscopan can increase the agreement between inter-raters in pediatric patients with IBD. Further investigation is warranted in order to confirm the significance of suggested change in mode of spasmolytics application on better MRE image quality and inter-rater agreement.

Bellows and Beyond: A historical review, examining the evolution of intussusception reduction - from the 17th century to the present day in Northern Ireland

A Blackburn¹, P Baird-Fraser¹, S Burnside¹, A Paterson¹
1. Royal Belfast Hospital Sick Children

Background: Intussusception is the most common abdominal emergency requiring surgery in infants. It occurs when a segment of proximal bowel (intussusceptum) invaginates into more distal bowel (intussusciptens), and it may result in complications including bowel obstruction, ischaemia, perforation and necrosis. Ileo-colic intussusceptions are the most common type; these are amenable to radiological reduction.

Peak incidence is between 4-36 months of age. The majority of cases are idiopathic; pathological "lead points" are documented more often in older children.

Historical overview: Venturing back in time to 1674, when Barbette proposed laparotomy to manage intussusception in his surgical textbook and moving forwards to the present, we describe how management has evolved.

Key dates:

- 1831: Successful air enema by Blalock on his own son
- 1838: Fireside bellows used to perform an air enema (Mitchell)
- 1871: 1st successful surgery in a child (Hutchinson)
- 1876: Manipulation and hydrostatic enema (Hirschsprung)
- 1886 +89: Cadaver experiments. 6psi acceptable pressure to reduce intussusception (Forest)
- 1913: 1st radiological diagnosis (Ladd)
- 1927: Barium enema reduction (multiple practitioners)
- 1948: Refining enema technique and the "Rule of 3s" (Ravitch/McCune)
- 1979: Diagnostic ultrasound in a child (Friedman)

- 1985: Ultrasound-guided hydrostatic reduction (Bolia)
- 1988: Re-introduction of guided air enemas to the Western world (Gu)

Current Guidance: In 2003, the British Society of Paediatric Radiology (BSPR) suggested departments have a 65-70% "raw" reduction rate. "Composite" reduction rates (CRR), discount cases where successful reduction is not theoretically possible (lead point/necrotic bowel at surgery).

In 2017 BSPR stated: Air enema is the technique of choice in the UK for attempted non-operative reduction of paediatric intussusception. US-monitored hydrostatic reduction has comparable outcomes to fluoroscopic-guided gas reduction

Belfast 2023

Multinational department - several consultants trained in mainland Europe. Fluoroscopically-guided CO₂ (air pre-2019) enemas and US-guided saline reduction both employed. Technique utilised dependent upon consultant's personal expertise. Annual audit of intussusception data from 2007 (16 years' information). 2007-2022 summated CRR (n=160) 86.9%. US-guided saline enema CRR (n=44) 84.1%. Fluoroscopically-guided gas enema CRR (n=116) 87.9%

Complication rate 2007-2022: 3/186=1.6%.

Conclusions: Standards for intussusception reduction are safely met in Belfast.

Imaging the Umbilicus

Beverley Newman¹

1. Stanford Childrens Hospital at Stanford University

Purpose/Objective: Illustrate and discuss the spectrum of lesions that occur around the umbilicus in infants and children, their imaging appearances and associated pathology.

Methods/Results:

Entities to be discussed include:

1. Omphalocele/umbilical hernia, problems and associations
2. Omphalitis
3. Urachus - patent, remnants, infection, mass
4. Vitelline duct - patent omphalomesenteric duct, remnants, Meckel's diverticulum and complications including bleeding, infection, intussusception, mass

Conclusions: It is important to have a thorough understanding of the embryology of the structures that traverse the umbilicus and the pathology that may occur in this region. Additionally, a retained connection to gut or bladder or remnants along these embryologic tracts, remote from the umbilicus, can mimic other pathologic entities and may be difficult to recognize.

Plain films can be helpful but are often nonspecific. The choice of additional imaging depends on the clinical presentation; ultrasound is often the first screening examination followed, if necessary, by CT, MR or nuclear medicine imaging studies for further diagnostic information.

Quantitative ultrasound liver measurements in obese and healthy children

E. Aguirre Pascual¹, M. Navallas Irujo¹, C. Gallego Herrero¹, M. Rasero Ponferrada¹

1. Hospital Universitario 12 de Octubre, Madrid, Spain

Background: Non-alcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease in children in many countries, closely linked to obesity. Liver biopsy is the gold standard for diagnosis. However, given its risk, cost and sampling variability, non-invasive imaging techniques have been investigated. US HepatoRenal Index (HRI) measures the differences in echogenicity between the right liver lobe and right renal cortex and has been described as an accurate method to diagnose and grade fatty liver disease, similar to US Attenuation Imaging (ATI).

Objective: To evaluate qualitative and quantitative measurements of liver parenchyma in healthy and overweight children using US HRI and ATI.

Materials and methods: This prospective study enrolled 32 overweight children with Body Mass Index ≥ 25 who underwent clinical abdominal US for liver disease and 35 children with BMI < 25 who underwent abdominal US for reasons other than liver disease. Exclusion criteria included absence of right kidney and non-optimal longitudinal US window for HRI measurement. HRI was obtained using ImageJ software by drawing two regions of interest (ROI) in the right liver lobe and two in the right kidney cortex on a single longitudinal image. All images were acquired in the supine position with the right arm extended above the head, through an intercostal approach for ATI.

Results: Thirty-five participants were healthy children (21 female) whose age ranged 4–15 years (mean 10.1 years, standard deviation [SD] 3.1); mean BMI 18 (range 13.4–24.6). Thirty-two participants were obese (13 female) whose age ranged 4–17 years (mean 12 years, SD 2.8); mean BMI 31.5 (range 25–61). Liver echogenicity was normal in 98.5% of healthy children (34/35) and in 34.4% of obese patients (11/32). HRI and ATI values were higher in patients with BMI > 25 than in healthy children (mean IHR 1.74 ± 0.52 vs 1.28 ± 0.38 ; $p < 0.001$ and mean ATI 0.7 ± 0.13 vs 0.54 ± 0.07 ; $p < 0.001$).

Conclusion: US HRI and ATI are feasible non-invasive quantitative imaging techniques that show a good diagnostic performance in detecting and grading NAFLD in children. Further studies with larger cohorts and liver biopsy correlation are needed to establish cutoff values.

Two case of colon duplications-use of diagnostic imaging in the evaluation of gastrointestinal tract duplication

Dubravka Milutinovic¹, Polina Pavicevic¹, Nevena Lazovic¹

1. University Children Hospital, Tirsova 10, Belgrade

Background: Gastrointestinal tract duplication is a rare congenital malformation associated with the presence of additional segment of the fetal gut. They can be diagnosed as early as the prenatal period but are frequently found in infancy or incidentally in adulthood. The most common involving the distal ileum and second most common the esophagus. Many duplication cysts are asymptomatic and discovered as an incidental imaging finding, though they can also be symptomatic with an array of clinical presentations dependent largely on their location.

Material: During 2022 we had two cases of duplication of colon. The first one is female infant, age 33 weeks (preterm), and the second one is sixteen years old, healthy girl. They both came in University Children Hospital in abdominal pain, distension, vomitus, with temperature, during night shift.

Methods: We perform an initial ultrasound (US), and computed tomography (CT). On ultrasound and CT, infant (both performed immediately after birth) had large, folded, tubular structure that seems like dilated colon, fill with anechoic fluid, wall thickness about 2mm without post-contrast opacification. The second case (older girl) on ultrasound had a cystic, heteroechogen mass, with clear color doppler signal, on the left side of mesentery, but on CT it showed as heterodense cystic mass with post-contrast opacification. Surgery was the principal method of management symptomatic duplications and there were no surgery complications observed of gastrointestinal duplications.

Results: The intraoperative findings were completely consistent with radiology imaging on CT and US. Pathohistology report confirmed in both cases –duplications of colon that are extremely rare (tubular in infants and cystic in older girl)

Conclusion: Clinical manifestations of gastrointestinal duplications cyst are variable. Imaging studies most frequently reveal thin- or thick- walled cystic/tubular structure, adjacent to the wall of the neighbouring gastrointestinal segment. Ultrasound and computed tomography are the methods of choice in the evaluation of gastrointestinal duplications. Given the diversity of anatomic locations, multiple differential diagnoses, and the need for surgical intervention, it is valuable to comprehend the role of multimodality imaging in diagnosing duplication cysts.

Communication of Findings in Acute Appendiceal Ultrasound: Perceptions of Certainty

Harsimran Laidlow-Singh¹, Fiona McCurdie¹, Claire R Lloyd¹

1. Paediatric Radiology, Evelina London Children's Hospital, Guy's & St Thomas' NHS Trust, London UK

Background: Communication of imaging findings, including conveyance of diagnostic certainty, is crucial to effective clinical radiology practice. This is particularly

relevant for studies which have a large bearing on patient pathway, i.e. whether or not to perform an appendicectomy in the context of acute abdominal pain in children. Furthermore, there is good evidence that ultrasound findings for acute appendicitis can be categorised reliably into two distinct groups: “positive” and “negative”. Report wording should clearly indicate either a high or low certainty of the disease being present. However, in reality, a wide variety of phraseology is used in free text. Prior studies have demonstrated the variability in perceived certainty ascribed to individual words and short phrases, but not in an applied clinical scenario such as this.

Materials and Methods: Retrospective QI (Quality Improvement) dataset of in- and out-of-hours ultrasound performed for acute appendicitis in children a tertiary paediatric hospital. Extraction of most commonly used concluding terminology. Perceived certainty evaluated by a survey of multiple professional groups including radiologists, surgeons, and emergency physicians. Identification of terminology with least and most variation in perceived certainty.

Results: We will demonstrate the degree of perceived certainty associated with commonly used phrases to communicate ultrasound findings in our dataset, including stratifying data according to the grade of operator, whether the study was performed outside normal working hours, and the professional group of the reader.

Conclusion: The language used in radiology reports is associated with a wide range of perceived certainty for the presence or absence of disease amongst medical professionals. For acute appendiceal ultrasound studies, interpretation of results into a dichotomous classification has been shown to be beneficial. Therefore selection of the most clearly understood phraseology is advisable. This could be adopted at individual level, or institutionally, including the use of standardized reporting templates.

Bowel Ultrasound – From the Essentials to the Extraordinary

Joy Barber¹, Andrew Bain¹, Steven Jarvis¹

1. Department of Radiology, St George's Hospital, London

Purpose: Bowel ultrasound is becoming increasingly commonly practiced.

It is important to have a strong grasp of the fundamentals of bowel ultrasound, to be able to distinguish normal from abnormal across the length of the bowel.

In addition to identifying active inflammation in the bowel, there are also more unusual pathologies that can be encountered. We will illustrate a range of these here.

Methods: We perform over 250 bowel ultrasound scans per annum, and present here for you the highlights from our experience.

We will start from the basics of how to ultrasound the bowel, and include a comprehensive pictorial review of normal and inflamed bowel across segments, with multi-modality correlation.

More unusual pathologies are also included from our archive, from the stomach to the rectum, including meckel's diverticulum, unusual GI tract infections, juvenile polyps, GVHD, bowel haematomas, vascular malformations, and a very unusual appendicitis amongst others.

Results: After this poster, the reader will be equipped with the basics to get scanning bowel ultrasound systematically, and will be enthused to push the boundaries in identifying new pathologies

Conclusion: We hope bowel ultrasound will become part of ‘routine’ abdominal ultrasound scanning, and a strong knowledge of the basics and awareness of more unusual pathologies is essential for good practice in this area.

Paediatric Small Bowel Evaluation – MRI or Ultrasound, a shifting balance?

Joy Barber¹, Steven Jarvis²

1. Department of Radiology, St George's Hospital, Blackshaw Road

2. Superintendent Sonographer, St George's Hospital, London

Background: At our tertiary centre, bowel ultrasound scanning has more than tripled since the Covid-19 pandemic whilst our MRI requests have remained relatively static - possibly due to restricted access to MRI during the pandemic building both our experience in bowel ultrasound and referrer confidence in the capabilities of ultrasound.

In adults, the METRIC study steered imaging of the small bowel in IBD towards MRI, however there is yet to be such definitive evidence of the benefit of MRI versus ultrasound in children.

We set out to investigate in which patients we are seeing bowel disease on ultrasound versus MRI, and to investigate the factors influencing the choice of modality.

Methods: Bowel imaging studies (both MRI and ultrasound) performed over a 2 year period (February 2021- 2023) were reviewed. Subsets of patients were evaluated who had

1) undergone both MRI and ultrasound during the study period

2) undergone multiple ultrasound or multiple MRI studies
Reports and images were reviewed for location and detectability of disease on MRI and ultrasound. Factors influencing disease detectability were noted.

Results: During the two year study period, 563 studies were performed on 371 patients. 44 children underwent both MRI and ultrasound assessment during the two year period.

Of the 44 children, 8 had their disease first identified on MRI, and 36 on bowel ultrasound. 9 patients had most of

their follow-up imaging with MRI, 10 equal between the modalities, and 25 with mostly ultrasound.

On review of the imaging and reports, bowel disease was better seen on MRI in 10 children, on ultrasound in 15 children, and equally well on both modalities in 19 children.

Where there was a preference for ultrasound, patients tended to be younger, and mostly had isolated terminal ileal disease, or multifocal jejunal/ileal and terminal ileal disease.

Conclusions: Bowel ultrasound in IBD has increased in recent years, and in some patients disease is seen more clearly on ultrasound than MRI. In our presentation we further explore the reasons behind this, and suggestions for patient selection for each modality.

No need for fasting prior to Doppler ultrasound of pediatric liver transplants

Martijn V. Verhagen¹, Ruben H. de Kleine², Hubert P.J. van der Doef³, Thomas C. Kwee⁴, Robbert J. de Haas⁵

1. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, m.verhagen@umcg.nl

2. Department of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, r.de.kleine@umcg.nl

3. Department of Pediatric Gastroenterology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, h.p.j.van.der.doef@umcg.nl

4. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, t.c.kwee@umcg.nl

5. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, r.j.de.haas@umcg.nl

Background: Children after liver transplantation undergo frequent routine Doppler-ultrasound (DUS) for which they are fasted, which may cause hunger and discomfort. We aimed to determine if DUS measurements are affected by prandial changes. We also tested the hypothesis that the portal vein (PV) velocity ratio (VR) is less affected by prandial changes than the PV intra-anastomotic peak systolic velocity (PSV), for the assessment of the PV anastomosis.

Methods: Children were prospectively included to undergo pre- and postprandial DUS at 6 months after LT at our national pediatric LT center. Pre-anastomotic PV PSV, intra-anastomotic PV PSV, and all other routine DUS measurements were obtained. For the PV the pre- to anastomotic VR was also determined. In addition, obscuration by bowel gas, difficulty of DUS because of distress, and impact of fasting on children and their parents were assessed.

Results: Twenty-four children (mean age at DUS 6.1 years, SD 5.9 years) were included. DUS measurements between pre- and postprandial DUS were not significantly different. The hypothesis that PV VR would remain more stable than intra-anastomotic PV PSV was disproven. The degree of obscuration by bowel gas or ease of DUS did not change after eating. The majority (13/24, 54.2%) of children found fasting difficult, and several (10/24, 41.7%) got upset when fasted.

Conclusion: Children with an LT do not need to be fasted for routine DUS, and this may decrease the disease burden. PV VR was not superior to intra-anastomotic PSV for the assessment of the PV anastomosis.

Is Washout a Reliable Indicator of Malignancy? Re-evaluating the Diagnostic Significance of Washout for Focal Liver Lesions in Pediatric Population

M. Thaler¹, D. Ključevšek¹, M. Glušič¹, A. Gazikalović¹

1. University Childrens Hospital of Ljubljana

Purpose: This study aims to determine the reliability of washout in liver intravenous contrast-enhanced ultrasonography (CEUS) as an indicator of malignancy in pediatric patients with focal liver lesions (FLL).

Material and methods: We performed a retrospective analysis of the last 50 liver CEUS exams at our hospital in children from newborn to 18 years of age. Only children with washout in liver CEUS were further evaluated and compared to clinical and laboratory data, abdominal MRI or CT and fine needle biopsy if available.

Results: Out of 50 liver examinations using CEUS only 4 children with FLL were identified as having a contrast washout. In 3 cases liver MRI with Primovist were performed and in one case abdominal CT. In 2 cases fine needle biopsy was done.

In 2 cases MRI with Primovist indicated atypical focal nodular hyperplasia (FNH), in one child the result of MRI was inconclusive as well as the result of CT in one case. Fine needle biopsy in children with inconclusive results was performed; smooth muscle benign leiomyoma associated with EBV was found, the other was malignant post transplant lymphoproliferative disease (PTLD).

Conclusion: Washout in focal liver lesions in the pediatric population may not always indicate malignancy, as it can also be observed in benign lesions. Therefore, accurate diagnosis requires good clinical information, additional imaging and/or lesion biopsy.

Despite the limited sample size, our study confirmed malignancy in only one patient who had PTLT. CEUS was a reliable diagnostic method only for FLL in cases with typical enhancement patterns. All atypical CEUS enhancement need further diagnostic procedures, despite low probability of malignancy.

Key words: Intravenous contrast-enhanced ultrasonography, CEUS, focal liver lesions, FLL, malignancy, benign lesions, washout, enhancement patterns.

Role of the Radiologist in management of Necrotising Enterocolitis (NEC) – A pictorial review for trainees

Maryam Adil¹, Aung Oo¹, Alexander Pearce¹, Richard Jenkins¹

1. University Hospital Southampton

Purpose: Necrotising Enterocolitis (NEC) is a most common acute gastrointestinal condition in infants, particularly premature infants. It is potentially life threatening and imaging plays a vital role in early diagnosis and identifying potential complications to limit morbidity and mortality.

The purpose of this educational poster is to demonstrate common imaging findings on plain abdominal radiographs, which remains the standard mainstay investigation, and the role of ultrasound and fluoroscopy.

Methods and Materials: A review of supine and lateral radiographs which illustrate the patterns of disease manifestation and common complications. We will also cover how ultrasound can be a useful adjunct in making the diagnosis and identifying the patients requiring surgery, and fluoroscopy can also be used in post resection NEC management.

Results: This educational poster will help trainee radiologists to learn about the common radiographic findings of NEC, when ultrasound can be used to aid diagnosis and the role of fluoroscopy in post-operative management of NEC.

Conclusions: Radiologists play a key role in early diagnosis of NEC, as imaging findings may precede clinical signs, and guiding the disease management.

Bilious vomiting does not always mean malrotation!

Dr. Rituparna Saha¹, Dr. Manigandhan Thayagarajan¹

1. Birmingham Children's Hospital

Purpose/Objective/Background: Bilious vomiting is a common clinical presentation in the neonatal age group at a Tertiary care Hospital. The neonatologists often raise the possibility of malrotation and get surgical and radiology opinion. An upper GI contrast study is often performed to rule out malrotation with or without volvulus. If positive for malrotation, the baby undergoes an urgent Ladd's procedure. However, not all neonates presenting with bilious vomiting have malrotation.

Materials: Birmingham's Children's Hospital is a tertiary care hospital in the West Midlands region of the UK. It runs a drive through service for neonates in the West Midlands region presenting with bilious vomiting.

Methods: This is an educational poster illustrating some examples of neonates who presented with bilious vomiting who did not have malrotation.

Results: The GI contrast study was performed in all the neonates in our poster. A detailed history was taken prior to the study. Sepsis was found to be the most common cause of bilious vomiting in premature infants. In the term neonates, although malrotation is the most common cause of bilious vomiting, other causes include Ladd's bands, duodenal atresia, jejuno-ileal atresia, meconium ileus, necrotising enterocolitis etc.

Conclusions: Bilious vomiting does not always mean malrotation. A detailed history is very important to consider sepsis as a possibility especially in premature babies. An ultrasound study may be performed to look at the SMA/SMV relationship, preduodenal SMV and situs etc.

Multi-reader study of quantified motility MR Enterography in Paediatric Inflammatory Bowel Disease: good agreement regardless of radiologist seniority

R Meshaka¹, C Foster¹, C Reid¹, E Allan¹, R Murphy¹, H Fitzke¹, A Menys¹, T Watson¹

1. Great Ormond Street Hospital for Children

Background: Small bowel disease response assessment using MR enterography (MRE) in paediatric inflammatory bowel disease (PIBD) is often subjective. Change in quantified terminal ileal (TI) motility ($\Delta_{\text{GIQuant}}^{\text{®}}$) used by expert readers has shown promise as potential biomarker of treatment response [1]. We investigated inter-reader agreement quantitative bowel motility measurements taken by junior, senior and expert readers.

Methods: This study was approved by local ethics committee (REC 10-H0-720-91). A single centre, retrospective search included all patients <18 years with PIBD and >1 MRE between 2012-2022. Cine images from each patient's first two MREs were processed using FDA approved GIQuant[®]. TI motility was assessed at both timepoints by two experts (paediatric radiologists, bowel subspeciality interest, >5 years consultant experience); two seniors (paediatric radiologists bowel subspeciality interest, <3 years consultant experience) and two juniors (paediatric radiology fellows). All readers completed the same training and 5 test cases before their reads.

Inter-reader agreement was assessed for each pair of readers as the Bland-Altman bias and limits of agreement (LoA) for $\Delta_{\text{GIQuant}}^{\text{®}}$ score (arbitrary units, a.u.) and %agreement in the Δ direction (stable/increasing vs decreasing score).

Results: There were 64 patients (33 male) aged 5-16, equating to 128 MREs, with a mean time between scans of 22 months (range 3 to 69 months). Diagnoses included 57/64 (89%) Crohn's disease, 3/64 (5%) ulcerative colitis, 2/64 (3%) very early onset PIBD and 2/64 (3%) PIBD unspecified. There was no systematic bias between any of the pairs of readers, with bias at 2 (95% CI -20 to 25), -26 (95% CI -64 to 11) and 2 (95% CI -64 to 11), in expert, senior and

junior readers, respectively, but more variation was seen between the senior readers. Reader agreement on Δ direction of motility score at the TI was fair-good with 86%, 63% and 86% between expert, senior and junior readers, respectively. **Conclusion:** Quantitative motility in PIBD MREs can be reliably measured by readers of varying experience with good levels of agreement. As a novel tool, these results are highly encouraging that if translated to routine clinical practice, GIQuant® could be used by any radiologist.

Ultrasonography evaluation of constipation in paediatric age group

Emine Neztet Oglou¹, Eirini- Dimitra Klontza², Aikaterini Kampouri³, Neslichan Kampasakal Chousein⁴, Savas Deftereos⁵

1. Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

2. Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

3. Associate Professor of Paediatric Surgeon, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

4. Neslichan Kampasakal Chousein: Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

5. Savas Deftereos: Associate Professor of Radiology, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

Purpose: The aim of this study is the estimation of rectal diameter and rectal wall thickness by Ultrasonography in order to evaluate constipation in paediatric age group. Also, to minimize the use of abdominal radiographs and if it is possible, digital rectal examinations.

Materials and methods: This study includes 14 children aged 2,5month to 13 years old, who presented with clinical abdominal pain and have diagnosed with constipation according to Rome III criteria. The control group consists of 21 children, who are constipation free. A transabdominal ultrasound was performed to measure the rectal diameter and the rectal wall thickness.

Results: The rectal diameter is larger (CPA 2,55 > 3,55 cm) and the rectal wall is thinner (CPA 0,44 > 1,17 cm) in children with constipation than in those without constipation. Our findings suggest that the transabdominal ultrasound scan might has a place in the diagnostic quiver of constipation and could replace the abdominal x-ray but not the digital rectal examination.

Conclusion: Transabdominal ultrasound scan may be a useful tool in the diagnosis of constipation. In paediatric age group with constipation rectal diameter is larger and rectal wall is thinner than in constipation free patients.

Limitations: Ultrasound is an operator-dependent examination and the findings may differ between radiologists. Also, the exam can be affected by different body types.

Vanishing Twinkles – A unique case of self-resolving infantile adenomyomatosis of Gallbladder

Sreekumar Muthiyal¹, Alaa Osman Koko¹, Jouhar Koller¹
1. Dept. of Radiology , Hamad General Hospital , Hamad Medical Corporation, Doha, Qatar PO BOX. No: 3050

Objective: To entice an interesting clinical entity, which is sparsely occurs at early years of life as per literature. To highlight the presentation and clinical course of the entity.

Introduction: Gallbladder adenomyomatosis is characterized by hypertrophy of the gallbladder mucosal epithelium and invagination of the mucosa into the thickened muscular layer, causing the formation of sinus tracts called Rokitan-sky-Aschoff sinuses (1). Cholesterol crystals from bile get trapped in these sinuses. Rarely, adenomyomatosis has been described in the pediatric population; however, even fewer cases have been described in infants (1,2,3). We present a similar case in a one and half -month-old female infant.

Case report: One and half month-old female infant was admitted our hospital with fever, vomiting and dehydration. The laboratory parameters revealed persistent hypokalaemia and metabolic alkalosis. Ultrasound abdomen was done as a part of work up, which showed distended gall bladder with multiple intramural and wall attached hyperechoic foci, showing comet-tail reverberation artefacts and twinkling artifacts on colour doppler; suggestive of adenomyomatosis of gall bladder. No feature of acute cholecystitis was seen. Follow up scan after three weeks revealed complete resolution of the above-mentioned hyperechoic foci. Hence further follow up was not required.

Discussion: Gall bladder adenomyomatosis has been rarely reported in the pediatric population and even fewer cases are reported in infants with a self-resolving course (1,2,3). Our indexed case is a similar one. The main patterns of gallbladder adenomyomatosis are generalized, localized, segmental, and annular (1,2). The differential diagnosis for gallbladder adenomyomatosis includes cholelithiasis, gallbladder polyps, and emphysematous cholecystitis (1).

Conclusion: Gall bladder adenomyomatosis is extremely rare in infantile age group. We present a similar interesting paradigm with a self-resolving course.

References:

Charles B. Chen et al. Gallbladder Adenomyomatosis in an Infant ACG Case Rep J e00433 July 27, 2020

1. Sindhura Alapati et al Neonatal adenomyomatosis of the gallbladder: An incidental finding at 12 hours of life Radiology Case Reports 2014;9(3);859.

Chelsea Sparks et al Infantile Adenomyomatosis of the Gallbladder in a 3-Month-Old. *JPGN Reports* (2021) 2:4(e140).

A pictorial guide tour through Paediatric Pancreas Pathologies

Vera Brazão Carvalho¹, Rita Prata¹, Pedro Riesenberger¹, Eduardo Bandeira¹, Ana Nunes¹, Eugénia Soares¹

1. Hospital Dona Estefânia - Centro Hospitalar Universitário Lisboa Central

Introduction: Once considered uncommon, pancreatic diseases are increasingly recognized in the paediatric age group. In this spectrum are included inflammatory and insufficiency disorders, but also focal disease, including cystic, solid and mass-like lesions.

Objective:

- To provide a pictorial overview of radiological findings of common and uncommon pancreatic pathologies, including lesions presenting as pancreatic masses in children and adolescents.

- To discuss the imaging technique of choice and differential diagnosis in each case, as well to illustrate key imaging features that allow differentiation of these pathologies.

Material and methods: Bibliographic review and retrospective analysis based on iconographic research in our paediatric university hospital picture archiving system.

Results: Commonly a few broad categories of diseases affect the paediatric pancreas that can be characterized on imaging: acute or chronic pancreatitis, pancreatic insufficiency disorders (cystic fibrosis, Schwachman-Diamond syndrome, history of steroid therapy), cystic lesions (pseudocysts, congenital simple cysts, autosomal dominant polycystic kidney disease, von Hippel-Lindau disease, cystic fibrosis, cystic neoplasms), solid neoplastic lesions (epithelial and non-epithelial) and non-neoplastic mass-like lesions (retroperitoneal tuberculosis or hematoma). A multimodality imaging approach are often used for evaluation of pancreas. The usefulness of ultrasonography in evaluating this gland in children is well known. Computed tomography (CT) or magnetic resonance imaging (MRI) with cholangiopancreatography (MRCP) are typically required for more thorough characterization. Patient age, signs and symptoms at presentation, laboratory test results, and potential underlying cancer predisposition syndrome can be helpful when formulating a differential diagnosis.

Conclusions: Diagnostic imaging plays a major role in the evaluation of the pancreas in children. For the diagnostic radiologist, complete knowledge of typical features that commonly affect this gland plays a critical role in appropriate management of pancreatic disorders in the paediatric population.

Hepato-renal index in children with overweight undergoing lifestyle intervention

Virginie Frings¹, Judith Lubrecht¹, Simon G.F. Robben², Anita C.E. Vreudenhil¹

1. Department of Pediatrics, Centre for Overweight Adolescent and Children's Healthcare, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands;

2. Department of Radiology, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands

Background: Hepato-renal index (HRI) is a non-invasive and quantitative imaging biomarker to detect liver disease. Non-alcoholic fatty liver disease (NAFLD) is present in up to 38% of children with obesity and can progress to end-stage liver disease. The only current treatment is combined lifestyle intervention. In this study we investigated the change of HRI in patients undergoing such intervention.

Methods: Patients <18 years old with overweight or obesity who underwent lifestyle intervention at the Centre for Overweight Adolescent and Children's Healthcare (COACH) in Maastricht, The Netherlands, were included. Weight, height and age were recorded at baseline and at follow-up after 1-4 years of treatment, together with ultrasonography of the liver with qualitative and quantitative analyses. Quantitative assessment with HRI was performed with a region of interest of 908 pixels placed in liver parenchyma without large blood vessels and compared to a region of interest in kidney cortex. The average of three measurements was taken as the definite HRI. Patients were categorized by increased or decreased body mass index (BMI) z-score at follow-up and changes in HRI per group were analyzed.

Results: Five-hundred-and-one patients were included with a mean age of 11.8 year (SD 3.6) and a mean BMI z-score of 3.2 (SD 0.76) at baseline. Median alanine aminotransferase (ALT) was 22 U/L (IQR 18-29) at baseline, and HRI 1.44 (IQR 1.24-1.68). ALT was not statistically different between non-steatosis and steatosis group at baseline ($p=0.18$), but HRI was significantly increased within the group of patients with steatosis ($p<0.001$). At 1-4 years of follow-up 141 patients were screened of which 57 patients (40%) had a stable or decreased BMI z-score. HRI was not significantly different at follow-up compared to baseline ($p=0.65$) and was irrespective of change in BMI z-score ($p=0.19$).

Conclusions:

HRI is not significantly different after 1-4 years of lifestyle intervention and is not associated with changes in BMI z-score within this time-window.

Cystic intraabdominal masses in children: a case based review

Dr Zoë Nicholls¹, Dr Emily Mayo¹, Dr Alison Evans¹

1. Radiology Department, University Hospital of Wales South Wales Radiology Training Programme

Background: Intra-abdominal cystic masses in infancy and childhood are uncommon. Their clinical presentation, localisation, aetiology and histology can differ significantly, presenting a diagnostic challenge. They may arise from the solid abdominal or pelvic viscera, retroperitoneum or mesentery. Accurate diagnosis is key in ensuring prompt and appropriate management. Ultrasound is the initial imaging investigation of choice, with subsequent cross-sectional imaging with CT or MRI used to help delineate anatomical associations and characterise further.

Purpose: Revision of common and less common causes of intra-abdominal cystic masses in children to use as an adjunct in what can often present a diagnostic dilemma.

Methods and Materials: Case studies of interesting and unusual cases of intra-abdominal cystic masses are presented to highlight a range of differential causes. Images will be used to demonstrate the radiological findings according to imaging modality which can be used to differentiate between different aetiologies.

Conclusions: Appreciating the typical radiological findings of common and less common aetiologies of intra-abdominal cystic masses is important to guide appropriate management and improve patient care.

Genitourinary

Voiding Cystourethrography: what a radiologist should know

Cristina Mota^{1,2}, Filipa Marques dos Santos^{1,2}, Paula Coelho^{1,2}, Ana Teresa Almeida^{1,2}

1. Department of Imagiology

2. Centro Hospitalar Vila Nova de Gaia/Espinho, EPE

Purpose/Objective/Background: Voiding cystourethrography (VCUG), also known as a **micturating cystourethrography**, is a fluoroscopic study of the lower urinary tract in which contrast is introduced into the bladder via a catheter. VCUG aims to image the urinary tract, including the urethra, bladder, ureters, and kidneys, during bladder filling and emptying. This test is commonly performed in children with prenatally diagnosed hydronephrosis (PNH), urinary tract infections (UTI), and voiding abnormalities. In this educational exhibit, we aim to review the clinical indications to perform **VCUG** from the American College of Radiology and the Society for Pediatric Radiology. We also aim to provide a “pictorial review” of the most common pathologies.

Methods/Materials: We will review the current literature and using cases from our hospital we will illustrate the normal anatomy of the urethra and bladder, urethral strictures, acquired urethral and bladder diverticula, vesicoureteral reflux, and congenital anomalies.

Results: The revision of the current literature revealed that the recent VCUG protocols are designed to optimize the visualization of disease and to improve patient safety, minimizing radiation exposure. In general, most VCUG protocols are identical: parents’ presence, contrast infusion by gravity, thin catheter without balloons, no contrast dilution, and voiding without a catheter in place.

Also, nowadays, the VCUG is indicated for evaluation of UTI, primary VUR, PNH, and lower urinary tract dysfunction including posterior urethral valve, and neurogenic bladder.

Conclusions: Thus, familiarity with these abnormalities and the use of proper techniques will allow the detection of the most common pathologic conditions with very low radiation exposure and will improve diagnostic accuracy.

Usefulness of Contrast-Enhanced Ultrasound (CEUS) in evaluation of early and late pediatric kidney transplantation complications

Dorota Majak¹, Katarzyna Chmielewska¹, Jędrzej Sarnecki¹, Małgorzata Szorc¹, Elżbieta Jurkiewicz¹

1. Department of Diagnostic Imaging, The Children’s Memorial Health Institute, Warsaw, Poland

Kidney transplantation (KTx) is considered the therapy of choice in end-stage renal failure. Despite considerable improvements in surgical techniques and perioperative care, KTx is still associated with a significant number of complications that can lead to graft failure.

Gray-scale ultrasound (US) coupled with color or spectral Doppler techniques is the first-line imaging modality for the evaluation of transplanted organs. Computed tomography (CT) or magnetic resonance imaging (MRI) can be used as second-line imaging modalities in certain cases, however they are associated with ionizing radiation exposure and iodinated contrast administration, and potential sedation and gadolinium contrast administration, respectively.

Pediatric applications of contrast enhanced ultrasound (CEUS) are growing, however, in Europe US contrast agents are not yet registered for intravenous use in children.

Possible indications for the application of CEUS in children following KTx are similar to those in adults. CEUS, using second generation contrast agents, can be used as a complementary tool to evaluate for vascular and parenchymal complications.

Objective: To present the usefulness of CEUS in the evaluation of vascular and parenchymal complications in renal allograft in children.

Materials: We present four cases of pediatric patients, in whom CEUS was applied to evaluate vascular patency, parenchymal perfusion and focal lesions in renal allografts.

Patient 1

CEUS was performed to evaluate vascularity and parenchymal perfusion in renal allograft with 4 renal arteries due to suspected vascular and ischemic complications.

Patient 2

CEUS was performed to assess parenchymal perfusion in the early postoperative period due to suspected local infarction in routine Doppler ultrasound.

Patient 3 and Patient 4

CEUS was performed in order to assess new focal lesions detected during the regular ultrasound follow-up.

Results: In Patient 2 (segmental infarction) and Patient 4 (PTLD), the pathological features identified in CEUS were confirmed using CT.

No additional invasive diagnostic procedures were needed in patients 1 (normal parenchymal perfusion) and 3 (benign lesion - cyst).

Conclusions: CEUS can provide additional, clinically relevant information in pediatric patients with early and late complications following renal transplantation. As an imaging modality with no nephrotoxic effects CEUS can be used repeatedly even in patients with limited renal function.

Herlyn-Werner-Wunderlich syndrome: US and MRI findings

Filipa Lima Coelho¹, Catarina Carvalho¹, Bruno Giesteira¹, Joana Maciel¹, João Amorim¹, Manuela França¹

1. Centro Hospitalar Universitário do Porto

Purpose: Herlyn-Werner-Wunderlich (HWW) syndrome is a rare congenital anomaly characterized by uterus didelphys with obstructed hemivagina and ipsilateral renal agenesis (also called OHVIRA).

Methods and Materials: Pictorial review of US and MRI scans of 3 cases of HWW syndrome incidentally diagnosed, at the age of 10 months, 12 years, and 13 years, that we're being followed in our institution in pediatric nephrology for renal agenesis.

Results: HWW syndrome is a rare congenital anomaly of the urogenital tract involving Müllerian ducts and Wolffian structures. The exact cause, pathogenesis, and embryologic origin of HWW syndrome are unclear. Usually is identified in the first few years after menarche. Imaging modalities used to diagnose this condition include US, MRI, and Laparoscopy, the last one also has a therapeutic value. US is a very helpful tool in the diagnosis of Müllerian duct anomalies. The detection of hydro/hematocolpos, can make the diagnosis of genito-urinary tract anomaly easier, as we have proven in our 10-month-old case.

MRI is a suitable technique for the non-invasive evaluation of female pelvic anatomy, but also to is also sensitive in detecting associated aspects of this syndrome such as renal tract anomaly endometriosis, pelvic inflammation, and adhesions.

The typical MRI findings will be the presence of uterus didelphys, hemivagina, renal agenesis, and some occasion even the presence of endometrial cysts in the ovaries. Our two older patients were clinically asymptomatic and presented right kidney agenesis and uterus didelphys, although they didn't have obstructed hemivagina with hematocolpos, however, both didn't have their menarche yet.

Surgical treatments depend on excision of the vaginal septum or its incision and marsupialization, which ensures outflow of the menstrual blood and considerably decreases the pain associated with hematocolpos.

Conclusions: Herlyn-Werner-Wunderlich syndrome is a rare anomaly with potential short and long-term complications. The diagnosis is likely to be missed, due to the absence of specific findings upon physical examination.

Thus, reporting such cases increases awareness of the syndrome and helps to achieve early diagnosis, in order to relieve acute symptoms, preserve normal fertility and prevent several medical complications.

Vesicoureteral reflux imaging in paediatric patients: can cystosonography replace micturating cystourethrogram?

MS Prevedoni¹, P.Lomoro², F. Ballati¹, L.Lungarotti¹, A.Citterio³, L.Preda¹

1. IRCCS Policlinico San Matteo pavia
2. Ospedale Valduce Como
3. Libero professionista

Objective: To demonstrate reliability of sonocistography as a strong alternative to micturating cystourethrography in the diagnosis and follow up of vesicoureteral reflux in infants and children.

Methods: A total of 97 pediatric patients ((49-boys and 48-girls), with an age range of 3 months-14 years, been recruited in the study. Each patient underwent a cystosonography by intravesical introduction of contrast agent (1ml-SonoVue), immediately followed by traditional cystourethrography. Passive and active vesicoureteral reflux was sought after spontaneous urination or abdominal press operation. The considered parameters have been the presence or absence of VUR, the grading of VUR, the mono- o bilaterality of it and its active or passive nature.

We considered the number of patients and of pielo-ureteral units.

The reference gold standard has been micturating cystourethrogram.

Results: We have demonstrated the high values of sensibility of sonocystography in detecting VUR, with a negative predictive value of 100%, and a high sensitivity, ranging from 81 to 92%.

Conclusion: The data seem to highlight the validity of the sonocystographic technique as an alternative to voiding cysturethrography in the diagnosis of vesicoureteral reflux in pediatric age, in agreement with other studies in the literature. The technique is highly sensitive and absolutely specific.

The study presented shows the criticalities of the low sample number requiring further data in favor of the technique.

High-resolution chest CT in children with severe asthma

Federica de Matteis¹, M. S. Prevedoni Gorone², M. de Filippo², A. Licari², L. Preda²

1. IRCCS ICS Maugeri Pavia

2. IRCCS Policlinico San Matteo Pavia

Purpose or Learning Objective: Central precocious puberty (CPP) is characterized by idiopathic activation of the hypothalamic-pituitary-gonadal axis, with appearance of secondary sexual characteristics in females before the age of 8 years, early ovarian and uterine development, accelerated growth rate and bone maturation, with short final stature. Hence, the importance of diagnose and pharmacologically treat girls with CPP. Clinical-laboratory-instrumental monitoring is necessary to assess therapeutic efficacy, specifically with pelvic ultrasound, simple and non-invasive, as the ultrasound parameters are reduced after 3 months of treatment. The uterine artery pulsatility index (IP), is indicative of actual pubertal activation, with cut-off=4.6; IP values, in fact, are lower in girls with CPP. Yet, not existing any studies on the role of IP in follow-up so far, we aim to study the potential role of IP as index of therapeutic efficacy.

Methods or Background: We performed a first pelvic ultrasound at the beginning of our observation and a second one after 12 months. We then compared the IP values of 20 patients on treatment with the ones of 24 patients on monitoring. As a continuous variable the IP values were defined as the mean value +/- SD; the t-test was used for comparison between the two groups.

Results or Findings: After one year, the mean of the IP value in the treatment group increased from 4.16 +/- 1.19 to 5.18 +/- 1.39, statistically significant ($p < 0.05$); in the monitoring group, the mean IP value decreased from 4.52 +/- 1.28 to 4.33 +/- 1.45. In addition, 12 treated girls (60%) regressed from a pubertal-type uterine artery flow pattern to a pre-pubescent one.

Conclusion: Our results suggest the usefulness of IP as an additional index of therapeutic efficacy.

Limitations: Our study limitation was the smallness of the sample.

Use of ultrasound prior to emergency scrotal exploration- experience at a UK tertiary centre

Timothy Strangeways¹, Meraj Ondhia¹, Srikrishna Harave¹, Divya Vaid¹

1. Alder Hey Children's Hospital

Background: UK and European guidelines differ in their recommendations when investigating clinically equivocal testicular torsion [1,2]. Current UK guidelines [2] recommend that imaging should not be performed in patients with clinical features suggestive of torsion. Negative surgical exploration is preferable to a missed diagnosis as all imaging studies have a false-negative rate and there is a low threshold for going to surgery. European guidelines have recommended that ultrasound should only be performed in equivocal cases when the likelihood of torsion is low. Given the disparity in recommendations we sought to analyse our local practice at a major children's hospital.

Methods: 50 consecutive cases of patients who underwent emergency scrotal exploration were retrospectively identified RIS (CRIS, wellbeing software). Surgical findings were obtained via the operation note (Meditech). Elective scrotal explorations were excluded.

Results: 50 patients were included from January 2019 to July 2020. There were 28 cases (56%) considered to be 'true positives' which included testicular torsion (8/50), torted hydatid of morgagni (17/50), intermittent torsion (2/50) and bell-clapper (1/50). 12/50 (24%) had nil acute findings on surgical exploration and deemed true negatives. Other causes identified on exploration included epididymitis (1/50), epididymo-orchitis (7/50), idiopathic scrotal oedema (1/50) and indeterminate possible epididymo-orchitis (1/50) - constituting the remaining 20% of the caseload. Only one case from our dataset had a pre-operative ultrasound scan that did not identify any acute pathology and on surgical exploration found to have epididymitis.

Conclusion: In paediatric patients who underwent emergency scrotal exploration there is low utilisation of preoperative ultrasound (1 ultrasound in 50 consecutive cases). This is entirely in keeping with current UK guidelines. A negative exploration of 24% in our centre compares favourably with other major Centres in the UK (3). Imaging could be considered for a small number of children after assessment by a senior clinician, in late presenters or in those with atypical features. Our data from a major children's hospital in northwest England supplements findings from the literature [3] that there is low incidence of testicular torsion in emergency scrotal explorations and that pre-operative ultrasound is rarely used.

References:

1. European guidelines - ESPR Uroradiology Taskforce—imaging recommendations in paediatric uroradiology, part VIII: retrograde urethrography, imaging disorder of sexual development and imaging childhood testicular torsion | SpringerLink 2. UK guidelines - torsion-commissioning-guide.pdf (england.nhs.uk) 3. Gopal, M. et al. (2021) “Emergency scrotal exploration in children: Is it time for a change in mindset in the UK?,” *Journal of Pediatric Urology*, 17(2). Available at: <https://doi.org/10.1016/j.jpuro.2020.11.029>.

Our experience with contrast-enhanced voiding urosonography in paediatric patients

Pedro Riesenberger¹, Vera Brazão Carvalho¹, Ana Forjaco¹, Rita Carneiro¹, Eugénia Soares¹

1. Hospital de Dona Estefânia - Centro Hospitalar Universitário de Lisboa Central

Introduction and objective: Contrast-enhanced voiding urosonography (ce-VUS) is a technique that utilizes sonographic contrast to study the lower urinary tract, particularly to detect vesicoureteral reflux. We aim to provide a review of the technique and imaging findings of ce-VUS studies based on the experience at our institution.

Material and Methods: Topic review based on bibliographical research and selection of case images from a paediatric university hospital. Whenever possible imaging findings are correlated with clinical data and other imaging studies.

Results: Vesicoureteral reflux is defined as an abnormal flow of urine from the bladder to the upper urinary tract and is an important factor for the development of upper urinary tract infections in children. In the past voiding cystourethrography (VCUG) has been considered the primary imaging method to study children with suspected vesicoureteral reflux. Ce-VUS has emerged as a technique comparable to VCUG. Its main advantage is the absence of ionising radiation, preventing long term detrimental effects. Occasionally, other abnormalities commonly associated with vesicoureteral reflux, such as duplication of the renal collecting system or posterior urethral valves, can be detected with ce-VUS. Key imaging findings are addressed and revised.

Conclusions: Ce-VUS is a valuable imaging tool to study vesicoureteral reflux and prevents children from being subjected to ionising radiation. Paediatric radiologists should be familiar with the technique and key imaging findings.

Unusual Case of an IgG4-related disease

Stevan Nikšić¹, Peter Slak¹, Senja Mali Brajović¹, Domen Plut¹

1. University medical center Ljubljana

Introduction: Immunoglobulin G4 (IgG4)–related disease is a systemic disease that is characterized by

fibro-inflammatory lesions rich in IgG4-positive plasma cells. Its pathogenesis is poorly understood, but findings are consistent with both an autoimmune and an allergic disorder. Imaging plays an important role in demonstrating infiltration and enlargement of involved organs. Patients often present with subacute development of a mass in the affected organ, sometimes mimicking a neoplastic process. IgG4-related disease usually shows a marked response to corticosteroid therapy. We present an unusual case of an IgG4-related disease.

Case presentation: A 13-year-old boy was referred for abdominal ultrasound because of dysuria. Abdominal ultrasound showed a well-defined homogeneously hypoechoic mass deriving from the outer gastric wall in the antrum of the stomach. Color Doppler revealed moderate vascularity within the lesion. MRI confirmed the solid tumor within the gastric wall. There were no signs of enlarged lymph nodes or distant metastasis. The mass had intermediate signal intensity on T1-weighted imaging, intermediate-to-low signal intensity on T2-weighted imaging, no restriction on diffusion-weighted imaging, and homogeneous enhancement on post-contrast T1-weighted imaging. Endoscopic fine needle aspiration was performed. Histopathologic analysis showed sclerotic, fibrosing spindle cells, suggesting the diagnosis of a gastric desmoid fibromatosis – a benign, potentially locally aggressive lesion. US follow-up was indicated. Control US performed in 3 months showed lesion growth, which lead to surgical removal of the tumor. Histopathologic analysis showed a dense lymphoplasmacytic infiltrate, a storiform pattern of fibrosis, and obliterative phlebitis, all of which are signs of IgG4-related disease.

During this time, urethrography was also performed. Urethrography showed a stricture about 1 cm in length in the bulbar part of the urethra. Due to IgG4-related disease of the stomach, corticosteroid therapy was initiated which significantly improved dysuria. The follow-up urethrography showed no stricture.

Conclusion: We presented a case of an IgG4-related disease, which manifested with dysuria as a result of a lesion in the bulbar part of the urethra and with asymptomatic lesion in gastric wall. Although definitive diagnosis requires histopathologic analysis, radiologists should be familiar with its possible clinical and imaging manifestations to avoid unnecessary surgical interventions.

Comparison of renal allograft function in pediatric and young adult patients to renal function of individually matched healthy controls using ASL MRI perfusion technique

Tijana Radovic^{1,2}, Milica M. Jankovic³, Mirjana Kostic², Brankica Spasojevic², Mirjana Cvetkovic², Ivana Gojkovic⁴, Polina Pavicevic^{1,2}

1. University Children’s Hospital, Department of Radiology, Belgrade, Serbia

2. University of Belgrade, Faculty of Medicine, Belgrade, Serbia

3. University of Belgrade, Faculty of Electrical Engineering, Department of Signals and Systems and BioMedical Instrumentation and Technologies (BMIT), Belgrade, Serbia
 4. University Children's Hospital, Department of Nephrology, Dialysis and Transplantation, Belgrade, Serbia

Background: Perfusion represents a blood flow at the level of the tissue capillary bed and determines the delivery of nutrients and oxygen to the tissue. Renal perfusion is also a key determinant of glomerular filtration, therefore, a central measure of renal function monitoring. The development of a non-invasive and reliable method for renal perfusion estimation that would reflect glomerular filtration rate (GFR) would significantly improve on-time identification of potential allograft injury.

We aimed to discriminate renal allografts with impaired function in paediatric and young adult patients by measuring cortical renal blood flow (cRBF), as well as a comparison with cRBF values of healthy controls using magnetic resonance imaging arterial spin labelling (ASL-MRI).

Material and Methods: We performed 3D GRASE FAIR ASL-MRI on 1.5T in 20 paediatric and young-adult allograft patients (10 male, median age 15.5yrs.) and 20 individually matched healthy controls, covering the whole kidney region with 8 slices in order to calculate cRBF on parametric maps. It was correlated to calculated GFR and compared between patient groups with good ($GFR \geq 60 \text{ mL/min/1.73m}^2$) and impaired allograft function ($GFR < 60 \text{ mL/min/1.73m}^2$) as well as with healthy controls.

Results: cRBF in the patient group ranged between 85 and 335 mL/100 g/min (mean $190.05 \pm 67.62 \text{ mL/100 g/min}$). Mean cRBF in patients with good allograft function was significantly higher than in patients with impaired function (225.91 ± 64.38 vs $146.22 \pm 41.84 \text{ mL/min/100g}$, $p=0.005$), showing a highly significant correlation with GFR in all subjects ($r=0.64$, $p=0.002$). In healthy controls, mean cRBF was significantly higher than in patients with poor allograft function (322.00 ± 121.36 vs $146.22 \pm 41.84 \text{ ml/100gr/min}$, $p=0.002$) and showed no difference to patients with stable function (322.00 ± 121.36 vs $225.91 \pm 64.38 \text{ ml/100gr/min}$, $p=0.056$). ROC curve of cRBF for distinguishing allografts with impaired function from allografts with good function showed high area under the curve $AUC=0.859$, with $p=0.007$ and overall good sensitivity of 81.8% and specificity of 66.7%

Conclusion: Cortical renal blood flow as measured by ASL-MRI perfusion technique is considered completely safe and non-invasive, with high potential in assessing renal allograft function.

Innovation

The Clinical and Surgical Applications of Virtual Reality in Radiology: a Scoping Review

Henrique Coimbra Baffi, Tolulope Opa., Brian Tsang., Aarayan Gupta., Andrea Schwarz Doria., Mirkamal Tolend

Purpose: To scrutinize the current status of knowledge on non-educational applications of VR and AR in radiology; addressing their clinical and surgical applications, cost-effective strategies compared to status quo and benefits of use in proposed populations.

Methods and Materials: MEDLINE, EMBASE and Cochrane databases were used in a literature search for studies using VR/AR as a clinical tool, interventional aid or alternative therapy. Study characteristics were described, and quality of reporting was evaluated using STARD guidelines.

Results: Ten papers were included, having 320 pediatric and adult patients with a wide range of pathologies, from knee pathology to back pain, cerebral and craniomaxillofacial abnormalities, post-fracture, and malignancies. There was great variability in study designs: 6/10 (60%) being descriptive case series; 2/10 (20%), randomized clinical trials; 1/10 (10%), a cross-sectional design and 1/10 (10%), a prospective cohort design. The uses of VR in this review were as a clinical tool for pre-surgical planning (40%), intra-operative assistance (30%), anxiety reduction (10%), assessment of effectiveness of balance training in chronic back pain (10%), and supplemental assistance to ventriculocopy (10%). STARD scores of primary studies were overall poor (averaging 12, maximum, 30). 7/10 (70%) papers yielded STARD scores ≤ 15 . Inter-rater reliability of STARD was substantial (intraclass correlation coefficient, 70% (95% CI, 23%–91%). No information on VR/AR cost-effectiveness in patient management was available in included papers. Most primary studies showed better outcomes in VR groups than control groups, or in clinical and surgical outcomes.

Conclusions: Although study results point towards a positive uptake in the use and utility of VR/AR in clinical and surgical settings, substantial improvement in the quality of reporting of methods is urgently needed.

Clinical Relevance/Application: Preliminary field studies show VR's clinical and surgical utility, encouraging further research. Nonetheless, a coordinated effort is required to design and conduct high-quality VR/AR studies.

Miscellaneous

Case report: Orbital hemangioma

Dubravka Milutinovic¹, Natasa Milcanovic¹

1. University Children Hospital, Tirsova 10, Belgrade

Background: Orbital hemangioma are common in children, but are rarely found in neonates. They are usually smaller in size and are most often discovered as an incidental find. Capillary hemangiomas of the orbit also known as strawberry hemangiomas, on account of its coloring, or orbital infantile hemangiomas are the most common orbital tumors of infancy. Usually present as a periorbital subcutaneous mass. In a minority of cases the tumor is deep to the skin overlying the orbit and has a more variable presentation: diplopia, ptosis, proptosis.

Material: A male patient, three months of age, first went to the eye clinic due to protrusion of the right eyeball. Based on the clinical picture (increased temperature, pain, redness, tearing, oedema) but also elevated values of inflammation (leukocytes, CRP), he treated as an eye infection. Due to protrusion of the eyeball that did not recede, after a month they come to the University Children Hospital for an emergency radiology diagnostic- computed tomography (CT) of the orbit and ultrasound.

Methods: The CT examination was done post-contrast, where in the complete right orbit is observed loose connective tissue that uniformly, intensively opacifies, which displaces the orbital muscles and discretely suppresses the optic nerve and pushes the eyeball forward and lateral. Based on the radiological picture that most indicated diagnosis was the orbital hemangioma. But there was still a discrepancy between the clinical and radiological picture, a supplementary diagnostic examination was performed - ultrasound examination of the periorbital region (included lower eyelid). The ultrasound picture show solid, hyperechogenic change (mass) with a clear color doppler signal that indicates a hemangioma of the right orbit.

Results: After radiology diagnostic, diagnosis was clear-orbital hemangioma. After a few days, the patient received adequate treatment by an ophthalmologist (propranolol) where a reduced hemangioma was soon noticed, which completely receded in a few months.

Conclusions: Radiology imaging is essential for narrowing the diagnostic considerations and determining the most appropriate management strategy for orbital hemangioma.

Extensive deep vein thrombosis (DVT) in May Thurner syndrome

Dušan Banovac¹, Nevena Lazović¹, Zorica Joković¹

1. Radiology department, University Children's Hospital, Belgrade, Serbia

Objective: May-Thurner syndrome is a rare vascular anatomic variant that represents a compression of the left common iliac vein from the right common iliac artery. It was described in 1957. by May and Thurner. While over a half patients with compression are asymptomatic, some may

manifest most likely as DVT and its sequelae. Computed tomography (CT) venography is considered a “gold standard” in diagnosing May-Thurner syndrome.

Case report: We present a rare case of a 16-year-old, male patient with May-Thurner syndrome manifesting as a first episode of acute and extensive DVT.

Patient was admitted to our clinic with swelling and pain in his left leg, five weeks after the lateral fibular malleolus fracture. Laboratory showed elevated D-dimer, with normal CRP and blood count. Ehosonography showed an absence of blood flow and intraluminal masses in the left common iliac vein, left femoral, popliteal, and crural veins.

We performed and analyzed contrast-enhanced abdominal and lower extremities CT venography. Indirect CT venography was performed in two phases: arterial with 25s delay, and late venous phase with 120s delay.

CT venography showed signs of compression of the left common iliac vein, as well as intraluminal thrombotic masses inside the left common iliac vein, femoral vein, popliteal, and crural left veins.

Conclusion: This was the first case of DVT caused by May-Thurner syndrome, to our knowledge, in the last 10-year period in our clinic. Considering the patient's prior injury, as well as positive family history of DVT, and our lack of experience, at first we were unsure of the diagnosis, however, due to well-performed CT venography we were able to get the right diagnosis. After that patient was transferred to a vascular clinic for further treatment.

UIOs-unidentified inguinal objects. Imaging exploration overview of inguinal region in neonates and children

Evangelia Manopoulou¹, Loukia Tzarouchi¹, Georgios Oikonomoulas¹, Konstantinos Iosifidis¹, Georgia Papaioannou¹

1. Department of Pediatric Radiology, Mitera Children's Hospital, Athens, Greece

Objective: To present the imaging approach in inguinal region swelling in neonates and children.

To consider the differential diagnosis and point out the imaging characteristics of the various entities.

Methods-materials: We examined neonates and children who presented with signs of inguinal swelling or palpable mass, with or without tenderness.

Ultrasound was the modality of choice in evaluating the inguinal region. In one case, MRI was necessary for further exploration.

Results: A number of inguinal canal pathologic entities were recognized and are presented, such as: hydroceles in boys (communicating or not), hydroceles of the canal of Nuck in girls, inguinal testicle (cryptorchidism), spermatic cord cyst, omental and bowel hernias and herniation of

ovaries and uterus. We also noted a case of dilated inguinal region due to circulation of free air bubbles through the canal and hemiscrotum in a preterm neonate with bowel perforation and another, due to a herniating abdominal tumor. Extracanal inguinal findings include inflammatory and infiltrated neoplastic lymphnodes and a case of a femoral artery pseudoaneurysm after catheterization.

Conclusions: Swelling of inguinal region is a common complaint in pediatric patients. Ultrasound is the modality of choice in identifying and differentiating between the various pathologic entities. The majority of inguinal region lesions is of intracanal location, due to patent processus vaginalis. Extracanal pathology is less common but should be considered in differential diagnosis.

Imaging profile of juvenile recurrent parotitis

Filipa Lima Coelho¹, Catarina Carvalho¹, Pedro Maganinho¹, Joana Maciel¹, Manuela França¹

1. Centro Hospitalar Universitário do Porto

Purpose: Juvenile recurrent parotitis is defined as recurrent inflammatory parotitis in children of unknown etiology. It is a rare condition characterized by multiple episodes of parotid swelling and/or pain associated with fever or malaise over a period of years. The aim of this study was to investigate the imaging profile of children with recurrent parotitis.

Methods and Materials: Pictorial review of typical alterations of the parotid parenchyma secondary to recurrent parotitis in the pediatric population, by doing a retrospective analysis of ultrasound and sialography scans performed in our institution, in the last two years.

Results: Most recurrent parotitis etiologies in pediatric age are benign, and the most common diagnosis in our population is juvenile recurrent idiopathic parotitis since the universal introduction of a vaccine for mumps (another cause of parotitis).

Juvenile recurrent parotitis is characterized by a non-obstructive and non-suppurative nature, and commonly begins between 3 and 6 years of age. Although most of the cases are idiopathic, juvenile recurrent parotitis might be the first presenting symptom of an underlying variable immunodeficiency, HIV infection and Sjogren's syndrome.

This pathology is usually unilateral, but can occur bilaterally with symptoms, usually more prominent on one side. Even though most of the cases are idiopathic, juvenile recurrent parotitis might be the first presenting symptom of an underlying variable immunodeficiency, HIV infection and Sjogren's syndrome.

Although the diagnosis is mostly based on clinical features, imaging can be used to confirm it and evaluate complications.

Acute and non-acute parotid ultrasound predominantly showed the presence of a heterogeneous gland, with multiple hypochoic areas. Sialography was requested for imaging

the extra- and intraglandular duct system, with high spatial resolution. Most of the sialography studies performed suggested chronic parotitis, showing Steno's duct irregularity and focal strictures, and the presence of punctuate and globular sialectasis.

Conclusions: Although in most of the patients, the symptoms resolve spontaneously after puberty, in severe cases destruction of the glandular parenchyma with a diminution of its functionality can occur. Adequate imaging diagnosis and characterization is essential to prevent further complications.

Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age

Gozde Ozer¹, H. Nursun Ozcan¹, Burak Ardicli², Tezer Kutluk³, Berna Oguz¹, Mithat Haliloglu¹

1. Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Turkey

2. Department of Pediatric Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

3. Department of Pediatric Oncology, Hacettepe University Faculty of Medicine, Ankara, Turkey

Background: Hepatoblastoma (HB) accounts for two-thirds of primary malignant liver tumors in children and mostly occur under the age of five. Hepatocellular carcinoma (HCC) is the second most common primary malignant liver tumor, often seen after the age of ten. Although some characteristic imaging findings have been described in both HB and HCC, it is difficult to distinguish between these two tumors when a patient is over the age of five.

Materials and methods: The radiology archives were searched to assess HB and HCC patients older than 5-year-old between 2007-2022. Initial MRIs and/or CTs of all patients were evaluated for the presence of background liver disease, signal characteristics of lesions, contrast enhancement pattern, presence of necrosis, central scar, tumor capsule, and portal/hepatic venous involvement. Maximum transverse diameter, PRETEXT stages and annotation factors were noted. In addition to imaging findings, initial symptoms, age at diagnosis, serum alpha-fetoprotein (sAFP) levels, histopathological results, and follow-up data were reviewed.

Results: A total of 19 children (16 boys, 3 girls, mean age=10) were included. There was no significant difference between HB (n=9) and HCC (n=10) groups in terms of age and gender. PRETEXT stage III and IV were more common in HB-group (n=2 and n=6, respectively), and stage I and II were more common in HCC-group (n=3 and n=4, respectively); albeit this failed to reach statistical significance (p=0.053). sAFP values were significantly higher in the HB-group (sAFP-mean=235068 ng/ml) compared to the

HCC-group (sAFP-mean=34009 ng/ml) ($p=0.002$). Tumor size was found higher in the HB-group (mean=133 mm) than the HCC-group (mean=87 mm); however, there was no statistically difference ($p=0.06$). Also, there was no difference between two groups in presence of necrosis, central scar, and tumor capsule. Initial MRI was available for 6 patients with HB and 7 patients with HCC, and there was no difference regarding ADC-values (HB-group-mean= 0.8×10^{-3} mm²/s; HCC-group-mean= 1×10^{-3} mm²/s, $p=0.13$).

Conclusions: In this study, PRETEXT stage and sAFP values were found higher in the HB-group. Although it is difficult to distinguish between HB and HCC with clinical features and imaging findings in patients over 5 years of age, these findings may help in differential diagnosis.

Congenital Nasal Pyriform Aperture Stenosis - The Case Series

Dr Jelena Grgur¹, Dr Gordana Milak¹, Dr Darko Dožić¹

1. Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, Novi Sad, Serbia

Background: Congenital nasal pyriform aperture stenosis is a very rare and potentially lethal form of airway obstruction in newborns. It is due to bony overgrowth of the nasal lateral process of the maxilla. This anomaly may present itself as an isolated malformation or may be associated with other cranial-facial anomalies.

Materials and methods: Four full-term infants aged 0 days to 3 months were admitted to the pediatric clinic in the period from 2014 to 2023: three infants were referred with signs of neonatal respiratory distress and choanal atresia, and an infant due to acute nasopharyngitis. In all four patients, respiratory problems were registered in the form of cyclic respiratory distress, noisy, difficult nasal breathing, and nasal discharge. The dominant finding was the nasal (sub)obstruction. Computed tomography (CT) was performed in all the patients.

Results: Non-enhanced CT of the facial bones and part of the endocranium was performed. All patients were diagnosed with stenosis of the pyriform aperture of less than 8 mm (5,3 to 7,4mm). In two patients, a triangulated hard palate was also present, and in three infants a prominent solitary central incisor of the maxilla was detected. Three out of four patients were treated surgically, while one patient was treated conservatively with air humidification and local corticosteroid therapy. Sufficient breathing is established in all patients after therapy.

Conclusion: Infants are obligate nasal breathers, and any degree of nasal airway obstruction can cause significant aerodigestive symptoms. Whereas soft tissue edema is the most common cause of bilateral nasal obstruction, the differential includes a list of rare diagnosis, including bilateral choanal atresia, midnasal stenosis and congenital nasal pyriform aperture stenosis.

Role of MRI in imaging of infantile hemangioma

Spasic Jelena¹, Stokanovic Vesna¹, Denic Sasa¹, Mladenovic Sanja¹

1. Center for radiology, University Clinical centre Nis, Serbia email: sp.jelena@gmail.com

Purpose/Objective/Background: Infantile hemangioma is the most common benign vascular tumor found predominantly in the head and neck region. During the first year of life hemangiomas tend to have progression in size with involution happening during the early childhood. Rarely hemangiomas need treatment, surgical or other, mostly when presented with complications such as bleeding or when massively enlarged. Infantile hemangiomas most likely occur in female. The aim of this case report is to present an infant with bleeding hemangioma of head and neck and its response to treatment.

Methods: The examinations were performed on MRI GE (General Electrics) 3T SIGNA PIONEER. T2-weighted, T1-weighted, diffusion-weighted (DWI), T1-weighted contrast enhanced images were used in protocol.

Materials: The patient is three-months-old male who underwent MRI examination in Center for radiology in University Clinical center Nis.

Results: Our patient presented with large hemangioma of the neck region on the left side with occupation of the skin and the left ear and it extended through the back skin. Another similar lesion is found in neck subcutis on the left side and it possible extended in the parotid gland. Almost full regression of the hemangioma is presented after treatment with beta blockers year later on followup scan.

Conclusion: Magnetic resonance imaging (MRI) is a modality of choice for evaluation of infantile hemangioma in the head and neck region with atypical clinical appearance or when surgical treatment is needed. Initial MRI examination and further follow-up is important for identification and characterization of the hemangioma.

Paediatric Occipital Lymph Node Normal Reference Range Derivation

Joy Barber¹, Charlotte Kendall², Steven Jarvis³

1. Department of Radiology, St George's Hospital, Blackshaw Road

2. Radiology Registrar, Department of Radiology, St George's Hospital, London

3. Superintendent Sonographer, Department of Radiology, St George's Hospital, London

Purpose: At our centre, we receive approximately 300 neck ultrasound requests per year from the community for persistent soft tissue lumps, likely lymph nodes. Where a specific palpable lymph node is indicated by the parents at the time of scanning, it is most commonly a level 5 cervical lymph node (36%), followed by occipital nodes (25%).

Whilst reference ranges have recently been published for cervical nodes levels 1–6 (Spijkers et al, *PedRad* 2020), there are no published reference ranges for occipital nodes – which in our experience tend to be much smaller.

We therefore set out to establish reference ranges for occipital lymph nodes.

Methods: Occipital lymph nodes were measured on paediatric MRI head studies performed for non-oncologic, non-infective/inflammatory indications. Studies were also excluded if a ventricular shunt was in situ, or if the image resolution did not allow clear visualisation of the nodes (normally due to feed and wrap technique with no surface coil). The standard MRI protocol included axial FLAIR 4mm, DWI 4mm, T2 4mm, SWI, Coronal T2 3mm, Sag T1 SE.

Results: Preliminary results of 100 children (54 male) demonstrates a mean short axis measurement of 3.5mm for occipital lymph nodes, median 3.4mm (IQR 3–4.1). No significant difference was seen between right and left, age groups or genders.

Conclusions: Here we present the first reference ranges for occipital lymph nodes in children.

Musical Interventions in the Radiology Suite: A Call to Look into Pediatric Radiology

Luis Octavio Tierradentro-Garcia, MD¹, Karen I. Ramirez-Suarez, MD¹; Monica Miranda Schaeubinger, MD¹

1. Department of Radiology, Children's Hospital of Philadelphia

Purpose: To evaluate the existing evidence on music's role in patients' outcomes while undergoing radiological diagnostic exams or interventional procedures.

Materials and Methods: We conducted a systematic search using MEDLINE, EMBASE, Scopus and Web of Science for studies published until February 28, 2023 in concordance to PRISMA guidelines. We included prospective studies that evaluated the effects of music on patients undergoing radiological diagnostic exams and/or interventional procedures. We excluded reviews but manually searched their references to include original studies that were not selected during the primary search. Outcomes included subjective levels of comfort (e.g., anxiety and pain levels), dose of sedation, and vital signs. Titles/abstracts were reviewed by two researchers who were blinded to each other's responses; a third researcher resolved any discrepancies. We summarized the types of study, types of intervention, and outcomes.

Results: Title/abstract screening was conducted for 659 remaining studies after deleting duplicates. Sixty-two full-text articles were reviewed for determining inclusion. A total of 45 studies were included for qualitative synthesis, of which 18 (40%) were published in radiology journals. Studies were published between 1990 and 2023, 62% published in the past ten years. Most studies (n=19, 42.2%)

were conducted in the USA. Coronary angiography was the most common procedure (n=13, 28.9%), followed by breast imaging diagnostic and interventional studies (n=8, 17.8%). Anxiety level was the subjective outcome most commonly evaluated (n=37/45), and music intervention reduced anxiety in 25/37 (67.6%) studies.

Only 6 studies (13.3%) included pediatric patients; the modalities for these studies included: interventional radiology (n=1), ultrasound (n=1), MRI (n=3), head CT (n=1). Only one of the studies was published in a radiological journal. Overall, results showed that music could decrease sedation requirements and increase comfort.

Conclusions: Music is an inexpensive, accessible tool that can be used in the radiology suite to help decrease discomfort in patients undergoing diagnostic exams or interventional procedures. While most studies observed that music helps decrease the periprocedural levels of self-reported anxiety in adults, the question remains unanswered for the pediatric population due to the paucity of literature and the limited sample size of the current studies.

Intranodal MR lymphangiography of central lymphatic pathways - how we do it and a case report

Matija Žerdin, dr. med.¹, Aleš Slanič, dr. med.¹, Simona Plajnič Vesenjsek, dr. med.¹, Lea Gril, dr. med.¹, Sonja Golob Jančič, dr. med.¹, prof. Nataša Marčun Varda, dr. med.¹

1. UKC Maribor

Background: Lymphatic flow disorders include a wide range of abnormalities that can be congenital or acquired. In the developed world, lymph flow disorders in children are most often associated with congenital heart defects and heart surgery, less often with complex anomalies of the lymphatic system. In adults they are most often due to malignant diseases, worldwide the most common cause are parasitic infections.

Lymphoscintigraphy was historically used for assessment of the peripheral lymphatic pathways but as it has low spatial resolution it is not well suited for imaging of central lymphatic pathways. Dynamic contrast-enhanced magnetic resonance lymphangiography (DCE MRL) has been developed as a non-ionizing alternative, which has much better time and spatial resolution and is better suited for imaging of central lymphatic pathways.

Methods and materials: We used intranodal dynamic contrast-enhanced magnetic resonance lymphangiography (IN DCE MRL), which allows visualization of central lymph flow disorders and is used in diagnosis of plastic bronchitis, protein loss enteropathy, chylothorax and chylopericardium and related conditions. Beside anatomic visualization the method also allows for functional assessment of lymph flow direction and drainage. The IN access was obtained using ultrasound and verified either using doppler or CEUS.

Results: We first present the IN DCE MRL technique and illustrate it with a case of a 16-year-old girl with a generalized lymphatic anomaly (GLA) with consequent disruption of lymph flow and clinically evident chyluria, chylothorax and chylous ascites.

Conclusions: DCE MRL is an excellent method allowing anatomic as well as functional assessment of the central lymphatic pathways in children as well as in adults.

What can the National Museum of Belgrade teach us about Radiology?

Michael Jackson¹

1. NHS Lothian

Background: International conferences offer outstanding opportunities for education, innovation and collaboration within the meeting venue, but can we also seek to enhance our understanding of our work, our patients and ourselves through the culture available within the hosting city? The National Museum in Belgrade, founded in 1844, houses a wealth of archaeological artifacts and art from pre-history to the 21st century. This presentation will demonstrate the relevance of selected artworks housed within this celebrated institution to paediatric radiology.

Methods / Materials: Utilising the National Museum catalogue via online resources, several items and artworks with thematic, technical or perceptual relevance to radiology were identified.

Results: Works from numerous historical eras were selected, but with a predominance from the late 19th and early 20th century. These include: a ceramic vase from 6th century BCE, the Rosette architectural motif found in Serbian churches of the late Middle Ages, *Fugitives from Herzegovina* by Uroš Predić (1889), *Female head in a goblet* by Odilon Redon (c1895), *Self-Portrait* by Nadezda Petrović (1907), *The Shepherdess* by Sava Šumanović (1924), *Co-op III* by Hannes Meyer (1925), and *Group Family* by Marko Čelebonović (1931). Collectively, these works have much to teach us about how images are constructed, the visual processes involved in how we perceive them, the selectivity of what is (and is not) included within an image, together with powerful humanitarian messages, of profound importance within our role as healthcare professionals.

Conclusion: ESPR delegates will greatly benefit from this “crash-course” in Serbian culture, gaining an appreciation of the relevance of art history to the principles and practice of paediatric radiology.

Dermoid cysts in infants: can we avoid a GA MRI?

Dr Olivia Anderson¹, Dr Michael Jackson¹

1. Radiology Department, Royal Hospital for Children and Young People, 50 Little France Crescent, Edinburgh, EH16 4TJ

Aim/Background: Dermoid cysts are benign developmental lesions that occur on the head and neck region in children with an incidence ranging between 1.6 – 6.9%^[1]. MRI has been utilised to exclude intracranial extension prior to surgical resection, but typically requires general anaesthesia in young children. A number of cases in which GA MRI was conducted without prior ultrasound prompted review of the imaging pathway in our institution, with the objective of developing a protocol to eliminate inappropriate imaging in this context.

Methods: Retrospective analysis of all head US, MRI and CT studies performed between 01/01/2012 – 01/01/2023 containing the keyword ‘dermoid’ in patients younger than 3 years old was undertaken. Data was assessed to identify the diagnostic pathway performed in each case and whether there was any evidence of intracranial extension.

Results: 137 studies were identified. 89 (66%) of these had US only evaluation. 99 dermoid cysts were confirmed in total, of which 69 diagnoses were made after US, 12 after MRI only, 1 dermoid cyst was confirmed on CT only and 17 were diagnosed after a combination of imaging modalities, the most common combination being MRI after US. In 26 cases the initial diagnosis of dermoid cyst was altered following imaging, 13 of which had ultrasound alone. Across all studies, there was no confirmed intracranial extension.

Conclusion: On the basis of our experience and published literature we suggest that external angular dermoid cysts showing typical features do not require cross sectional imaging^[2] Lesions located close to the midline may require cross-sectional imaging but ultrasound should be performed in the first instance. Low-dose, rapid acquisition CT may offer a means of excluding an associated skull defect without requirement for general anaesthesia.

References:

- 1) Al-Khateeb TH, Al-Masri NM, Al-Zoubi F. Cutaneous cysts of the head and neck. *Journal of oral and maxillofacial surgery*. 2009 Jan 1;67(1):52-7.
- 2) Mead J, Kirkpatrick J, Murdoch J, Stringer MD. Is pre-operative imaging of external angular dermoid cysts in children necessary?. *Journal of Paediatrics and Child Health*. 2022 Aug;58(8):1420-4.

Neck masses can be a pain in the neck: A selection of interesting cases requiring a multimodality approach.

Samuel Alsford¹, Srikrishna Harave¹

1. Radiology Department, Alder Hey Children's Hospital

Palpable neck masses are common in the paediatric population and can be challenging to diagnose given the broad differential and need to exclude malignancy.

Ultrasound has established itself as the initial imaging modality of choice and in many cases can provide a definitive diagnosis. More complex cases and/or ones with

atypical initial imaging features may however require a multimodality approach. MRI provides further characterisation and can help to establish extension into the deep neck spaces. CT is less common, but may be used in the acutely unwell patient if there is a concern regarding abscess formation. Nuclear medicine can also play a role in select cases.

Here, we present five varied and interesting cases of children presenting with a neck mass, which serve to highlight the broad range of pathologies one may encounter in this cohort. Pathologies include an infected branchial cleft cyst, parathyroid adenoma, plexiform ganglioneuroma, plunging ranula and ectopic thymic tissue. For each, we discuss the clinical presentation, imaging approach and findings, and details of the patient's management with a view to establishing key learning points for the reader.

We hope that this poster will be entertaining and instructive and serve as a useful reminder to those radiologists involved in the imaging of neck masses in children in the future.

Determining the stability of vitamin D in stored Guthrie dried blood spot samples: retrospective cross-sectional study

Sarah Adedara¹, Fabrizio Messina², Professor Amaka Offiah³

1. University of Sheffield Medical School, Sheffield, UK
2. School of Health and Related Research, University of Sheffield, Sheffield, UK
3. Professor Amaka Offiah, Radiology Department, Sheffield Children's NHS Foundation Trust, Sheffield, UK

Background: The diagnosis of inflicted injury in a preambulant infant is one of exclusion, with no features being perfectly diagnostic of the condition. An important differential diagnosis to consider is rickets, this can increase an infant's likelihood of developing fractures due to poor bone mineralisation. Healthy bone mineralisation is dependent on vitamin D (25OHD) mediated phosphate and calcium absorption. 25OHD concentrations measured from Guthrie cards of new-borns heel prick tests have been used to later determine the bone health in infants presenting with unexplained fractures. This study aims to determine the stability of 25OHD concentrations measured from Guthrie blood samples over a sequential period of time; to ascertain whether 25OHD measured shortly after birth can be used to assess the bone health of an infant several months later.

Method: The 25OHD concentrations of 720 dried blood spot samples obtained from a new-born heel prick test, in the South Yorkshire and East Midlands area, was measured using liquid chromatography tandem mass spectrometry. The samples were split into nine groups with varying storage duration times ranging from 3 weeks to 8 years. Levels measured at 3 weeks served as baseline and were compared to samples with a storage duration of 1, 3, 6, 9 and 12 months and 2, 3, 5 and 8 years.

Results: From baseline the median 25OHD concentrations decreased by 20% ($p < 0.04$), 21% ($p < 0.001$), and 45% ($p < 0.001$) after 3, 5 and 8 years of storage respectively. Levels measured after 3 and 6 months of storage were 38% ($p < 0.001$) and 62% ($p < 0.001$) greater than baseline whilst levels measured after 1 and 12 months and 2 years were not significantly ($p > 0.05$) different from baseline.

Conclusion: The results are suggestive of a decline in 25OHD 3 years post storage, potentially occurring secondary to degradation due to molecular instability, poor blood sampling methods and potential sunlight exposure in acquisition and transportation of samples. Additionally, the seasonal variability of 25OHD could account for the increase in its concentration recorded after 3 and 6 months of storage. These samples were collected in early autumn and summer, whilst the remaining samples were obtained in winter.

PIK3CA-related overgrowth syndrome's (PROS) spectrum of imaging findings

Spyridon Prountzos¹, Nikolaos Papagiannis¹, Melanthi Tsikna¹, Sofoklis Antonakis¹, Maria Spanou², Argyro Mazioti¹, Efthymia Alexopoulou¹

1. 2nd Department of Radiology, National and Kapodistrian University of Athens, University General Hospital "Attikon"
2. Pediatric Neurology Unit, 3rd Department of Pediatrics, National and Kapodistrian University of Athens, University General Hospital "Attikon"

Learning objective:

- To familiarize the pediatric radiologist with a not-so-rare pediatric entity
- To present state-of-the-art imaging techniques for different forms of the PROS spectrum
- To review their radiological imaging features

Methods or Background: PIK3CA-related overgrowth spectrum (PROS) encompasses various overlapping phenotypes with varying severity. The core features are the congenital or early childhood onset of segmental/ focal overgrowth. Tissue overgrowth may include the fibrous, nervous, vascular, lymphatic, skeletal, or lipomatous origin. PROS disorders are driven by somatic, gain-of-function mutations in the PIK3CA gene, which encodes a subunit of the enzyme phosphoinositide 3-kinase (PI3K). The PI3K enzyme regulates cell growth and survival. The mutations responsible for PROS lead to hyperactivity of the PI3K gene, accelerating cell growth and division.

Findings: We retrospectively reviewed the radiologic findings of pediatric patients that were genetically diagnosed with PROS and treated in our hospital. Our PROS spectrum included four patients with unilateral hypertrophy of fibro adipose tissue of the lower limb and two patients with half-body hypertrophy. Primary lymphatic and combined vascular malformations were present in five patients.

Skeletal abnormalities were found in three patients. One was diagnosed with multiple lipomatosis. Imaging investigation included ultrasonography, Magnetic Resonance Imaging (MRI), and conventional radiography.

Conclusion: Patients with the PROS spectrum may include any combination of primary germ layers' overgrowth, thus leading to various imaging features depending on the germ layer involved. Radiological imaging of PROS patients is essential not only in the diagnosis (even in the perinatal period) but also in the follow-up after treatment.

Increasing Iron Supplementation in Breastfeeding Infants at the 4-month Health Maintenance Visit

Sukaina Afzal Furniturewala¹, Oneilia Brooks¹, Tony Abdel-Missih¹, Ayman Ibrahim¹, Smrithi Krishnamohan¹, Washington Marin-Castro¹, Penelope Martinez¹, Gabriela Rodas¹, Deepak Vijayan¹, Gregory Kenny¹, Amy Woolever¹, Jennifer Pintiliano¹

1. Pediatrics, New York City Health + Hospitals Elmhurst, General Pediatrics, Icahn School of Medicine at Mount Sinai

Introduction: Iron stores that are accreted in infants are eventually exhausted around 4–6 months of age. The content of iron in breastmilk remains low which warrants the need for iron supplementation in breastfed infants. The American Academy of Pediatrics (AAP) recommends that all exclusively or partially breast-fed infants receive iron supplementation of 1 mg/kg per day until complementary iron rich foods are introduced into their diet.[1]

Aims/Objectives: Aim: To increase transition from non-iron containing to iron containing vitamin supplementation in infants receiving any breastmilk by 30% from baseline over a period of four months.

Methods: We conducted a quality improvement project using 3 PDSA cycles. We reviewed charts of all infants who presented to the Pediatric Primary Care Clinic at their 4 months visit pre and post intervention to capture data for correct transition from non-iron containing to iron containing vitamin supplements. Exclusively formula fed infants were excluded from this study. We performed 3 PDSA cycles consisting of the following: 1. Education on transitioning to iron containing vitamins 2. Email reminders for reinforcement. 3. Introduction of a hard stop phrase in EMR for all 4 months well child visit encounters.

Results: At baseline the iron containing vitamin supplements prescription was at 55.2%. After PDSA cycle 1 overall prescription rates increased to 72.2% however in the fourth week there was a decrease to 54.5% due to provider non-adherence. After PDSA cycle 2 prescription rates increased to 79.3% and after PDSA cycle 3 prescription rates increased to 89.8%.

Conclusion: Education, email and EMR format changes that incorporated transitioning to iron containing vitamin supplements as part of anticipatory guidance helped improve effective transitioning to iron containing vitamin supplements.

Screening for elevated PHQ-9 scores in an Adolescent Clinic before and after COVID-19 lockdown measures

Sukaina Afzal Furniturewala, MD¹, Adila Chamavaliyathil, MD¹, Thaina Rousseau-Pierre, MD¹

1. Icahn School of Medicine at Mount Sinai

Background: In the United States, little is known on the effects of COVID-19 and its changes on mental health in adolescents, pre and post the lock-down measures. According to biannual Youth Risk Behavior Survey 2023, 57% of teen girls reported persistent sad or hopeless feelings in 2021, almost double the rate of boys and the highest levels reported this decade [1]

Objective: To ascertain more precise estimates of the elevated PHQ-9 scores in adolescents during COVID-19 and to compare these with pre-pandemic estimates.

Methods: Data on all patients seen in the Adolescent Clinic aged 12 to 22 that had a PHQ9 completed during both time periods of January 2019 to February 2020 (Pre-lockdown) and March 2020 to December 2021 (Post lockdown) was obtained using an report dashboard in our EMR. SPSS 25 software was used to calculate the PHQ9 means, % of PHQ9 greater or equal to 10. Mean PHQ9 scores in the two groups were obtained using paired sample t-tests. Chi-Square Test of Independence to determine an association between categorical variables and the outcome variable of positive PHQ-9. A logistic regression model was also used to determine factors associated with positive PHQ9 scores

Results: 790 adolescents were seen during both time periods. PHQ scores (greater or equal to 5) increased from 8.8 % to 14.2 from pre-lock down period to post-lockdown period(p<0.001). Among those with a PHQ9 score greater than 5 during both time periods, there were an average difference between pre and post lock down PHQ-9 score ($t_{102}=2.386$, $p=0.019$). In a logistic regression model, none of the predictor variables were associated with changes in PH9 scores during both time periods.

Conclusions: COVID-19 has been found to be associated with mental health changes in adolescents emphasizing the importance of a holistic approach that focuses on mental health when managing COVID-19

References:

Youth risk behavior survey: Data summary and trends report. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf. Published Feb. 13, 2023.

Neonatal Sepsis Before and During the Covid-19 Pandemic

Utsav Timalisina, MD¹, Kristina Ericksen, MD¹; Abhinav Thakral¹, MD; Kusum Viswanathan, MD¹; Arnikka Rubia, MD¹; Anushree Murugan¹, MD; Prasansa Basnet, MBBS¹; Bhawana Chhetri, MBBS¹; Fernanda Kupferman, MD¹

1. Department of Pediatrics, One Brooklyn Health, Brookdale Hospital Medical Center, Brooklyn, New York

Background: Neonatal sepsis is a major cause of morbidity and mortality among neonates. During the Covid-19 pandemic, preventive measures, shift of work force and medical supplies were adopted hospital wide to respond to the health crises. These measures might have impacted the incidence of neonatal sepsis, early onset sepsis (EOS), or late onset sepsis (LOS). The objective of this study is to assess if there was a difference in the incidence of neonatal sepsis before and during the Covid-19 pandemic.

Materials and Methods: A retrospective study was conducted to compare the incidence of neonatal sepsis before (March 2018–Feb 2020) and during the Covid-19 pandemic (March 2020–Feb 2021). Babies were diagnosed with neonatal sepsis if the microorganism was isolated from blood culture, urine culture or CSF culture OR if they received the antibiotics for suspected sepsis for at least five days and either had the WBC $<4 \times 10^9$ cells/L, CRP >1.5 mg/dL or immature to total neutrophil ratio (IT) >0.2 if no microorganism was isolated from the culture. The data were manually abstracted from the hospital's electronic medical records that included all live born neonates in our institution at Brooklyn, NY, from March 2018 to Feb 2021. The difference in the incidence of neonatal sepsis before and during the pandemic were analyzed using Chi-squared test.

Results: A total of 2402 neonates were born between March 2018 and February 2021 (1686 before and 716 during the pandemic). Of them, 235 babies (10%) were diagnosed with neonatal sepsis; 153 (9%) before and 82 (11.5%) during the pandemic. Maternal characteristics of the population are described in table 1. Despite the reduction in two known risk factors such as maternal chorioamnionitis ($p = <0.001$) and asymptomatic bacteriuria ($p = 0.014$) during the Covid-19 pandemic, there was no significant difference in the incidence of neonatal sepsis, EOS, and LOS (See table 2).

Conclusion: Our study results indicate that the preventive measures adopted from the neonatal and maternal unit during the pandemic might not have impacted the incidence of neonatal sepsis, EOS, and LOS during the pandemic.

Tubes and lines in neonates. A guide for residences.

Giatskos Vasileios¹, Mouroukis Apostolos¹, Emmanouela Tsouvala², Vasiliki Varlami², Aggelopoulou Panagiota¹, Savvas Defteraios³

1. Radiology Resident, General University Hospital of Alexandroupolis
2. Consultant, NICU, General University Hospital of Alexandroupolis
3. Professor of Radiology, General University Hospital of Alexandroupolis

Purpose: Tubes and lines used in Neonatal Intensive Care Unit are every day practice. The aim of our study is to illustrate the common sites and positions of these lines and tubes and to point out the need of knowledge about correct and proper location, position and anatomical course of various catheters (tubes and lines). Furthermore, residence must be familiar with the complications that can be provoked.

Materials and methods: The “babygrams” (chest-abdomen x-rays), ultrasound exams, fluoroscopy images and Computed Tomography scans from our department between 2012 and 2022 were retrospectively reviewed. The appropriate depiction of “tubes and lines” and the appropriate (or not) positioning of various tubes and lines were recorded.

Results: More frequent imaging depicted catheters are Feeding Tube (FT), Endotracheal Tube (ETT), Umbilical Vein Catheter (UVC) and Umbilical Artery Catheter (UAC). Also, quite often we have to deal with Central Venous Lines (CVL), Peripherally Inserted Central Catheters (PICC) and Chest or Peritoneal Tubes (e.g. for pneumothorax or postsurgical). The presence of complications is infrequent but all of these were noted. The most common complication from malpositioned catheters (except thrombus formation along the catheter) was hepatic hematoma from perforation of an intrahepatic vascular wall.

Conclusions: Imaging techniques provide usually accurate information about “tubes and lines” and their proper or not positioning. The knowledge of their expected anatomical course is crucial to reveal a tube or a line in malposition. Thus, we can prevent neonates from complications or structural injuries which may result in adverse consequences or even in prolonged duration of NICU hospitalisation.

Musculoskeletal

Pictorial review of Legg-Calve-Perthes disease and the role of a reporting radiologist in diagnosis and management outcome

Alexander Pearce¹, Richard Jenkins¹, Aung Oo¹

1. Southampton General Hospital

Purpose/Objective/Background: Legg-Calve-Perthes disease (LCPD) is a disease of the paediatric population characterised by the necrosis of the femoral head epiphysis during growth. The condition affects between 5–15/100000 children less than 15 years of age, peaking in its incidence between 4 and 8 years. Its aetiology and treatment remain a contentious debate despite being studied for more than 100 years.¹ Fortunately, classification by reporting radiologists has aided the appropriate management of such cases, whether this is conservative or surgical in its management.

The objective of this educational poster is to provide a pictorial review of the current literature and, ultimately, improve the confidence of radiology trainees in the accurate radiological detection and classification of LCPD.

Methods & Materials: Review of academic literature within the last decade and consolidating the important radiological findings within a poster format for the education of radiology trainees and reporting clinicians of all abilities. This will include PubMed resources detailing the aetiology, radiological findings, classification and management of paediatric LCPD cases.

Results: The available evidence detailing the aetiology and management of LCPD provides a diverse understanding of the condition, with current literature leaning towards LCPD being a mechanically induced ischaemia that progresses to femoral head avascular necrosis. Three classification systems: Catterall, Salter-Thompson and Herring, are used by reporting clinicians to assist the surgeons with prognosis, such as the percentage of femoral head involvement or degree of deformity². However, management is dependent on numerous individual factors and remains a topic of ongoing debate within surgical centres.

Conclusions: LCPD is a complex condition with varied radiological presentations lending to the need for ongoing educational reviews for trainees and senior radiologists alike. Radiology remains the pillar of diagnostic and prognostic information for the clinician, where the early detection of LCPD by the radiologist can significantly improve the morbidity of affected children. Therefore, this pictorial review LCPD will provide an invaluable resource to radiology trainees and reporting clinicians.

References:

- 1 Dillman J & Hernandez R. MRI of Legg-Calve-Perthes Disease. *AJR Am J Roentgenol.* 2009;193(5):1394-407.
- 2 Pavone V, Chisari E, Vescio A, Lizzio C, Sessa G, Testa G. Aetiology of Legg-Calvé-Perthes Disease: A Systematic Review. *World J Orthop.* 2019;10(3):145-65.

A trainee's guide to imaging of Juvenile Idiopathic Arthritis

Aung Oo¹, Richard Jenkins¹, Maryam Adil¹, Alexander Pearce¹

1. University Hospital Southampton

Purpose: Juvenile idiopathic arthritis (JIA) is an autoimmune chronic arthritic disease of childhood with many different subtypes. Early diagnosis and management are essential, as, without intervention, it can lead to debilitating complications such as limb-length discrepancy and joint deformity. While diagnosing JIA requires clinical evaluation and blood tests, imaging plays an essential role in detecting early inflammation before joint damage.

The aim of this presentation is for junior radiology trainees to get familiar with the imaging characteristics of JIA on different modalities and the role of the radiologist in JIA.

Methods and materials: A pictorial review is done to demonstrate imaging features of JIA involving different joints on US, MRI and radiographs. We will cover acute changes such as synovitis, joint effusion, bone oedema, and periarticular inflammation. Chronic changes such as bone erosion, rice bodies, ankylosis etc., will also be included.

Results: By highlighting the imaging features of JIA, we hope junior radiology trainees learn about the pros and cons of different imaging modalities and how to identify the typical imaging features of the diagnosis.

Conclusion: Knowledge of the disease spectrum and familiarisation with appropriate imaging modalities and imaging characteristics are paramount in image interpretation and early disease detection. We hope to leave trainees feeling confident to tackle JIA cases in their practice.

Hand Bone Dysplasia: A Radiographic Approach to Evaluation

Ercan Ayaz¹, Akçahan Akalın²

1. Department of Radiology, Diyarbakır Children's Hospital, Diyarbakır/Turkey

2. Department of Pediatric Genetics, Diyarbakır Children's Hospital, Diyarbakır/Turkey

Background

Disorders of bone are common findings not only in the genetic disorders but also in the endocrine and metabolic diseases. Dysplasia of hand can be seen as an isolated abnormality but frequently accompanies other disorders. In this presentation, we would like to describe characteristic findings of some groups of genetic, endocrine, and metabolic diseases that we have encountered in our hospital located in a region where consanguineous marriages and genetic disorders are quite common.

Methods: We evaluated our archive of pediatric genetics and metabolism departments and retrieved the hand radiographs of patients with genetically or clinically confirmed diagnosis of bone dysplasia/disorders.

Results:

1. Brachydactyly: It is the most frequent abnormality of hands. It can be seen partial or complete; an isolated finding or as part of a skeletal dysplasia or syndrome.

a. Metacarpal shortening more prominent: TRPV4-related disorders

b. Phalangeal shortening more prominent: Achondroplasia and related FGFR3 conditions,

c. Short hand instead of short digits (carpal hypoplasia more prominent): Hajdu-Cheney syndrome, microcephalic osteodysplastic primordial dwarfism (MOPD) type 2

2. Polydactyly: It is defined as an extra digit on the hand or foot. It can be attached to the adjacent digit (polysyndactyly), or can be well-formed with an articulated extra metacarpal. It is frequently seen in ciliopathies, Bardet Biedl syndrome, Ellis-van Creveld syndrome, trisomy 13.

3. Oligodactyly: It can be seen as a deficient digit or when the digits fail to separate during embryonic development. It can be seen in radial ray anomalies, Moebius syndrome, T-box family of transcription factor defects, oro-facial-digital syndrome type 10.

4. Epiphyseal/diaphyseal dysplasia: Mucopolysaccharidoses, Schimke immunosseous dysplasia, spondyloepiphyseal dysplasia (SED) congenital, 3M syndrome

5. Osteosclerotic disorders: Osteopetrosis, pyknodysostosis

6. Limb reduction defects (Split hand/ foot): Absence of central digits, with or without absence of central metacarpal/metatarsal bones, usually seen in ectrodactyly syndromes.

7. Non-syndromic metacarpal/phalangeal abnormalities

Conclusions: While evaluating hand dysplasia, pattern-based approach is helpful to narrow the diagnostic tests for responsible genetic/endocrine conditions. Number of phalanges, length, and thickness of the metacarpals and phalanges according to age, bone densities, epiphyses according to age are the main features that need to be evaluated.

Does Bone Health Index values Correlate with High-Resolution Peripheral Quantitative Computed Tomography parameters in healthy Children?

Heba saleh Shalo^{1,3}, Alan Rigby², Paul Dimitri^{1,4}, Amaka C. Offiah^{1,5}

1. Academic Unit of Child Health, Department of Oncology and Metabolism, University of Sheffield, Damer Street Building, Western Bank, Sheffield S10 2TH, United Kingdom

2. Institute of Clinical and Applied Health Research, Hull York Medical School, Hull, UK

3. Faculty of Medicine, Omar Al-Mukhtar University, Bayda, Libya

4. Department of Pediatric Endocrinology, Sheffield Children's NHS

5. Foundation Trust, Western Bank, Sheffield, United Kingdom

6. Radiology Department, Sheffield Children's NHS Foundation Trust, Western Bank, Sheffield, United Kingdom

Background: Bone densitometry plays a significant role in identifying children with low bone mineral density (BMD). Dual-energy X-ray absorptiometry (DXA) is currently the reference standard for evaluating BMD in children and adults. High-resolution peripheral quantitative computed tomography (HR-pQCT) and digital x-ray radiogrammetry (DXR) have been developed to measure bone mineral density and assess bone strength. Although HR-pQCT is not size dependent and can provide information about bone microarchitecture, it is costly and not widely available. Compared to DXA and HR-pQCT, DXR is easily used in children and widely available. DXR measures bone health index (BHI) and bone health index standard deviation score (BHI SDS) from wrist radiographs by using BoneXpert software.

Aim: Assess the degree of correlation between BHI and BHI SDS values and HR-pQCT parameters [including finite element analysis (FEA)] in male and female healthy children.

Methods: This study is a prospective observational cohort that recruited 20 healthy participants (10 males and 10 females) aged between 8 and 14 years. Each child underwent a wrist radiograph, along with an ipsilateral distal radial HR-pQCT scan on the same day. Pearson's correlation coefficient to calculate the degree of correlation between BHI values and HR-pQCT parameters was performed.

Results: The mean age for participants was 11 years. The mean BHI was 4.693, while BHI SDS was 0.056. There was a significant difference between males and females in BHI SDS ($p > 0.001$), but no difference in BHI ($p < 0.001$). The mean for HRpQCT parameters were (total density was 245.5mg/cm³, cortical density was 642.7mg/cm³, trabecular density was 166mg/cm³, trabecular thickness was 0.06mm, trabecular separation was 0.39mm, cortical thickness was 0.35mm and cortical porosity was 0.0455%). BHI-SDS showed a strong correlation with total density and trabecular density parameters ($r=0.62$ and $r=0.60$ respectively) and a weak correlation with cortical density ($r=0.3$).

Conclusion: Although the BHI SDS is dependent mainly on cortical structure, a strong correlation was found between the BHI SDS and trabecular parameters. So, BHI SDS may reflect the cortical and trabecular bone density in healthy children. We have another cohort of osteogenesis imperfecta patients whose results will be compared to those of healthy children.

Obturator Abscess in Children - A Mimicker of More Common Pathology

Dr Jelena Grgur¹, Dr Dragana Simić¹, Doc. dr Vukadin Milankov¹

1. Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, Novi Sad, Serbia

Background: Obturator abscess is a rare condition in children, which may be categorized as primary and secondary, most commonly affecting the muscles around the hip, including the iliopsoas, piriformis, obturators, adductors, and gluteal muscles. The diagnosis of obturator abscess is often prolonged due to low incidence of the disease and nonspecific signs and symptoms. The obturator abscess is often misdiagnosed as it mimics more common pathologies like septic arthritis of the hip, transient synovitis of the hip, acute retrocaecal appendicitis or perforated appendix, osteomyelitis or a psoas abscess. Timely diagnosis of obturator abscess is imperative in order to prevent the development of systemic complications.

Materials and methods: A 7-year-old boy was admitted to the Department of Abdominal Surgery of a regional hospital. The physical examination revealed abdominal

pain, pain in the right hip, limited movements of the right upper leg, and fever. Laboratory tests showed increased inflammatory factors. Ultrasound, as well as computerized tomography (CT) and magnetic resonance imaging (MRI) examinations were performed.

Results: At admission to the hospital, an ultrasound examination of the abdomen and hips were performed, and showed normal findings. A repeated ultrasound of the abdomen and hips verified a small synovial effusion within the right hip. On the fourth day of hospitalization, a CT of the abdomen and pelvis was performed, where an abscess collection was recorded along the lower branch of the pubic bone with the largest diameter being 30mm. Subsequently, pelvis MRI was performed, which detected an abscess collection within the right external obturator muscle with inflammation of the surrounding soft tissue. In the further treatment, antibiotic therapy was prescribed (Clindamycin, Garamycin, Maxicef), followed by a gradual improvement in the child's general condition and local results.

Conclusion: Although there are more common pathological entities with symptomatology within the right lower abdominal quadrant and right hip, an obturator muscle abscess can be found in children, with a need of prompt final diagnosis and treatment. Prolonged symptoms, not cleared up with ultrasonography have to be further inspected with more sophisticated diagnostic modalities.

Location-based differential diagnosis for benign lumps and bumps on ultrasound

Andrew Bain¹, Joy Barber¹

1. Department of Radiology, St George's Hospital, London

Purpose: To review common soft tissue lumps and bumps referred from the community for ultrasound assessment.

Methods: Using a body-map approach, we present a location-based and pattern-recognition approach to differential diagnosis for soft tissue abnormalities on ultrasound.

Materials: Ultrasound referrals for a 'lump' from community and general paediatrics were reviewed; scans detecting lymph nodes only as the cause were excluded from the imaging pool.

Results: Ultrasound imaging of lumps and bumps from the top of the head to the tips of the toes are presented, including dermoids, scalp haematomas, ectopic thymus, carotid body tumours, ranulas, thyroglossal duct cysts and branchial cleft malformations, atypical TB, pilomatricomas, injection site granulomas, ganglion cysts amongst others.

Conclusions: Sometimes on imaging the location is key; this body-map approach to distinctive ultrasound lumps and bumps should help in getting the diagnosis!

Reliability Assessment of the OMERACT Whole-Body Magnetic Resonance Imaging Scoring System for Juvenile Idiopathic Arthritis

Jyoti Panwar¹, Mirkamal Tolend², Eva Kirkhus³, Arthur B Meyers⁴, Bernadette Redd⁵, Iwona Sudol-Szopinska⁶, Nisha Varma⁷, Emilio J Inarejos Clemente⁸, Robert A Colbert⁹, Jonathan Akikusa¹⁰, Simone Appenzeller¹¹, John A Carrino¹², Nele Herregods¹³, Kerri Highmore¹⁴, Lennart Jans¹³, Jacob L Jaremko¹⁵, Thekla von Kalle¹⁶, Marion A van Rossum¹⁷, Dax G Rumsey¹⁸, Hemalatha Srinivasalu^{9,19}, Jennifer Stimec², Shirley M Tse²⁰, Marinka Twilt²¹, Nikolay Tzaribachev²², Andrea S Doria²

1. Lumus Imaging, Brisbane, Queensland, Australia.

2. Department of Diagnostic Imaging, Research Institute, The Hospital for Sick Children, and Department of Medical Imaging, University of Toronto, Toronto, ON, Canada.

3. Department of Radiology, Oslo University Hospital, Oslo, Norway.

4. Department of Radiology, Cincinnati Children's Hospital, Cincinnati, OH, United States.

5. Department of Radiology, Clinical Center, NIH, Bethesda, Maryland, United States.

6. National Institute of Geriatrics, Rheumatology and Rehabilitation, Warsaw, Poland.

7. Department of Medical Imaging, The Royal Children's Hospital, Melbourne, Australia.

8. Department of Radiology, Hospital Sant Joan de Deu, Barcelona, Spain.

9. Pediatric Translational Research Branch, Musculoskeletal and Skin Diseases, National Institute of Arthritis, NIH, Bethesda, MD, United States.

10. Rheumatology Service, Department of General Medicine, Royal Children's Hospital Melbourne, Australia.

11. Department of Orthopedics, Rheumatology and Traumatology, School of Medical Science, University of Campinas, Campinas, Brazil.

12. Department of Radiology, Hospital for Special Surgery, New York, United States.

13. Department of Radiology, Ghent University, Ghent, Belgium.

14. Department of Radiology, Children's Hospital of Eastern Ontario, Ottawa, ON, Canada.

15. Department of Radiology & Diagnostic Imaging, Stollery Children's Hospital, University of Alberta, Edmonton, Alberta, Canada.

16. Radiologisches Institut, Olga Hospital Klinikum, Stuttgart, Germany.

17. Amsterdam Rheumatology and Immunology Center, Reade, and Emma Children's Hospital Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands.

18. Division of Rheumatology, Department of Pediatrics, University of Alberta, Edmonton, Alberta, Canada.

19. Division of Rheumatology, Children's National Hospital and George Washington University School of Medicine, Washington, DC, United States.
20. Division of Rheumatology, The Hospital for Sick Children, Toronto, ON, Canada.
21. Department of Pediatrics, Division of Rheumatology, Alberta Children's Hospital, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada.
22. Image Analysis Group, Bad Bramstedt, Germany.

Background and Objective: Inflammation in joints and entheses is a common feature in juvenile idiopathic arthritis (JIA). It can be difficult to objectively quantify clinically or on imaging. In this study, we tested the inter-reader reliability of a newly developed whole body magnetic resonance imaging scoring system for JIA (JAMRIS-WBMRI).

Materials and Methods: Sixteen whole-body MRI and one pelvic MRI from children with JIA were scored independently by five radiologists using the JAMRIS-WBMRI scoring system administered through an online survey platform (RED-Cap) with integrated atlas and following a calibration tutorial. The scoring system contained 729 item-region combinations, including, 1) in peripheral joints (from sterno-clavicular to the distal interphalangeal joints): bone marrow edema (BME), effusion/synovial thickening (combined item), and pericapsular soft tissue edema; 2) in sacroiliac joints: BME and effusion/synovial thickening/capsulitis; 3) in spine [craniovertebral junction joints, facet joints from C2-C3 to L5-S1 and disco-vertebral units (DVUs) from C2-C3 to L5-S1]: BME and/or effusion/synovial thickening in craniovertebral junction and facet joints, BME in DVUs; 4) in entheses (22 attachments): BME, perientheseal soft tissue edema and tendon/ligament high signal; and 5) chronic nonbacterial osteomyelitis (CNO)-like lesions in 21 bone regions. The inter-reader reliability was assessed by Gwet's AC1 coefficient on the subset of items with at least 10% prevalence in sample.

Results: A total of 442 items in the JAMRIS-WBMRI received a non-zero grade in at least one reading. Within this scored subset of items, 117 items received a non-zero grade in >10% of the readings, of which 85 related to findings in the joints, 25 to the entheses, and 7 to CNO-like lesions. Interquartile ranges of the five-reader AC1 reliability coefficients were 0.67-0.79 (range: 0.51-0.91) for the joints, 0.71-0.86 (range: 0.48-0.97) for the entheses, and 0.73-0.85 (range:0.72-0.85)

The role of MRI in the assessment of bone material properties and strength: a systematic review

Nayef Alasmari^{1,2}, Dr Xinshan Li^{3,4}, Professor Amaka C Offiah^{1,5}

1. Department of Oncology and Metabolism, The University of Sheffield, Sheffield, UK.
2. Majmaah University, Saudi Arabia.

3. INSIGNEO Institute for in silico Medicine, The University of Sheffield, UK.
4. Department of Mechanical Engineering, The University of Sheffield, UK.
5. Sheffield Children's NHS Foundation Trust, Sheffield, UK

Objectives: (1) To evaluate the role of MRI in assessing bone size/shape, material properties, and strength; and (2) to investigate whether MRI-based finite element analysis (FEA) is an accurate diagnostic tool for assessing bone density, material properties, and strength when compared to other medical imaging modalities.

Methods: The Web of Science, Medline, and Cochrane databases were searched from January 1980 to 1 July 2021. The systematic review was carried out according to the PRISMA checklist and the critical appraisal skills program (CASP) quality assessment tool was independently used by three reviewers to assess the quality of eligible papers. A narrative synthesis of the eligible studies was then conducted.

Results: Of the 1,219 identified studies, 28 (27 in adults) were eligible for this review. These included a total of 733 patients, aged from 4 months to 99 years. MRI showed a high degree of reliability and reproducibility for assessing bone material properties and strength. In addition, MRI could help in detecting bone-related diseases and monitoring treatment progress. MRI-based finite element analysis was shown to predict fracture risk. In general, the included papers were of high quality.

Conclusion: MRI and FEA can estimate the material properties and strength of bone in adults. Only one study included children, which should be a focus for future research.

Keywords: Systematic Review; MRI; Finite element analysis; Bone mechanics; Bone density.

DISTRIBUTION OF IMMUNOLOGY FINDINGS AMONG PEDIATRIC PATIENTS EXAMINED BY MR UNDER SUSPICION OF SACROILIITIS

Nikola Eić¹, Petković M.¹, Koprivšek K.¹, Bogdanović B.¹, Balj Barbir S.¹, Đuretić A.¹, Milanović B.¹, Vijatov Đurić G.¹

1. Institute for Child and Youth Health Care of Vojvodina

Objective: To assess the distribution of serology positive patients among pediatric patients who underwent magnetic resonance (MR) exam of sacroiliac joints (SIJ) due to suspected sacroiliitis.

Material and methods: Retrospective study for the period of three years included 34 patients, 12 girls (35.3%) and 22 boys (64.7%), who underwent MR exam of SIJ in our MRI unit. Median age of patients was 12.5 (min 3; max 17.5; SD 4.12). MR exams were performed by Siemens Magnetom Aera 1.5 T, using standard protocol for SIJ. Serology and immunological data for all patients were collected from the hospital information system.

Results: MR signs of sacroiliitis were detected in 17 patients (50%); 9 (26.5%) of them had mild, 6 (17.6%) moderate and 2 (5.9%) severe MR changes. Gadolinium based contrast agent was applied in 17 patients (50%), contrast enhancement (CE) was registered in 10 cases (29.4%). Of all 34 patients, 10 (29.4%) were HLA B27 positive, 3 (8.8%) were positive on other HLA antigens (HLA B13, 35, 51, DQ), 1 (2.9%) was positive in each group of the following serology/immunology tests: Coxackie and Adenovirus IgM, Lupus anticoagulans (LA), anticyclic citrullinated peptide (antiCCP) and Antithyroglobulin antibody (antiTG). HLA B27 positive patients had SIJ MR changes in 7 cases (10%) (3 mild, 4 moderate), 3 (30%) had no MR detectable changes; in this group in 5 (50%) cases CE was present. 3 (100%) of other HLA antigens positive patients had SIJ MR changes (1 severe, 2 mild), two of them with CE. Each patient positive on LA, antiCCP and antiTG had SIJ MR changes with CE (LA positive patient had severe, following two mild MR changes).

Conclusion: Severe SIJ MR changes were observed in patients who were LA or HLA B13, 35, 51, DQ positive, while in the group of HLA B27 positive ones MR changes were absent, mild or moderate. Further investigation and a larger number of patients is necessary for getting statistically significant and more reliable results.

The use of musculoskeletal ultrasound in children with fracture suspicion

Roxana Iacob¹, Emil Robert Stoicescu¹, Diana Manolescu¹, Simona Cerbu¹, Emil Radu Iacob¹

1. Department of Radiology and Medical Imaging, The 'Victor Babes' University of Medicine and Pharmacy Timisoara Department of Pediatric Surgery

Background: Fractures are among the most common medical-surgical emergencies in people of all ages, and they play an important role in pediatric orthopedic pathologies because children are more active than adults. According to studies, boys are more likely than girls to present at the emergency room accusing long bone fractures. Musculoskeletal ultrasonography has been shown to be effective in detecting fractures and can be used as a complementary method to radiographic or CT examinations due to its non-irradiant nature.

Methods and materials: Children aged 1.5 to 19 years old with fracture suspicion but a negative/normal X-ray or patients with a lower suspicion of fracture were evaluated using ultrasound to disprove or confirm the presence of a cortical bone discontinuity. The study enlisted the participation of 42 pediatric patients.

Results: Seven of the patients examined had a history of chest trauma, but X-rays did not confirm the diagnosis. Ultrasound was instrumental in the diagnosis of rib

fractures, as well as in tracking the process of consolidation and callus formation.

Other interesting cases included a professional dancer and a tennis player who experienced pain in their lower limbs. Both patients were suspected of having tendinopathy. Surprisingly, the musculoskeletal ultrasound revealed a stress fracture in the right metatarsus II and a stress fracture in the right 4th metatarsus.

One patient was discovered to have a unicortical femoral fracture, also known as a "green stick" fracture.

On the other hand, for complicated bone injuries and non-linear fractures, ultrasound did not prove to be as sensitive as an X-ray.

Conclusion: Musculoskeletal ultrasonography can help support and diagnose long bone fractures, especially when clinical suspicion is high and the X-ray hasn't revealed a clear cause or diagnostic. Because it is not irradiating, it is also a sensitive method for detecting early callus formation and can be a repetitive imaging method.

Anterior knee pain in children and adolescents; review of common and uncommon etiologies and their imaging characteristics.

Charlotte Gallienne¹, Kelly Ainsworth¹, John Donnellan¹, Secil Eksioğlu¹, Heba Takroui¹, Yongdong Wang¹, Samuel Stafrace¹

1. McMaster University, McMaster Children's Hospital, Hamilton, Ontario, Canada

Purpose: To review the multi-modality imaging characteristics of causes of anterior knee pain in children and adolescents.

Background: Anterior knee pain is a common clinical scenario for which children and young adults are referred for imaging. Causes (and reciprocal imaging) findings are different to the adult population with a significant number of etiologies being specific or more common in the immature skeleton.

Methods and materials: Retrospective review of cases referred for imaging for anterior knee pain over the last 2 years was performed.

Results: The imaging characteristics of typical and atypical causes of anterior knee pain are presented taking an 'outside in' anatomical approach. These include cases with pain related to subcutaneous tissues (ex: bursae, abscesses), the extensor mechanism (ex: tibial apophysitis, patellar tendinitis), the anterior knee joint compartment (ex: chondromalacia patellae, OCD, patellar subluxation/dislocation, infection, inflammation), the intra articular extra synovial fat (ex: anterior impingement), non-anatomical specific conditions that can present with anterior pain (ex: regional non aggressive and aggressive lesions, hematological conditions), atypical pathologies (ex: regional vascular lesions) and causes of referred pain (ex: hip conditions such as SCFE).

Conclusion: Causes of anterior knee pain in children and adolescents are common and multiple. This presentation reviews this spectrum of conditions and outlines their radiological manifestations assisting the reporting radiologist exclude these pathologies in a systematic manner.

Frequency and Patterns of Motion Artifact in Pediatric EOS Spinal Imaging

Sean Schoeman MBChB¹, Shyam Venkatakrishna, MBBS¹; Savvas Andronikou, MBBCh, PhD¹

1. Children's Hospital of Philadelphia

Introduction: Stereoradiography imaging (SRI) reduces radiation exposure in children requiring serial imaging studies for chronic conditions such as scoliosis (1). SRI (EOS system) is preferential conventional radiographs for this reason. The technology uses a digital slot-scanning in which different types of artifact have been documented: edge-enhancement, movement, and incorrect-centering artifact (2)(3).

Methods and Materials: Retrospective review of EOS spinal images was conducted. Imaging features were captured, and artifact was identified. When present, artifact was analyzed to determine if it mimicked hardware distortion, worsened an apparent scoliosis or altered other anatomy. This was confirmed through analysis of prior / follow-up studies by an attending pediatric radiologist.

As the project progressed apparent horizontal plane distortion, was compared by measuring Cobb angle, width of the pelvis (iliac crest to iliac crest), and transverse thoracic diameter. We determined if the widening caused worsening of scoliosis.

Results: 81 EOS studies were evaluated (54 females; 67%) (median age 12.8 years [IQR: 10.6 - 14.5]). The whole spine was included in all but one case where the sacrum was cut off. Vertebral body visualization was good in 20 (24.7%), moderate in 44 (54.3%) and poor in 17 (21%). Scoliosis was noted in 76 cases [93.8%].

10/81 (12%) patients demonstrated artifact. Movement artifact alone was present in 4; edge-enhancement artifact in 1; incorrect-centering artifact in 4 and one scan demonstrated all three types of artifacts. In one case of movement artifact, wavy distortion of the spinal fusion rods was not present on subsequent imaging. In 4 cases of widening exaggerating scoliosis, the measured widening was ≤ 4 cm in the chest (greatest transverse diameter). Bilateral iliac crest width increased ≤ 4 cm and exaggerated scoliosis, increasing Cobb's angle by up to 16°.

Conclusion: Movement and incorrect-centering artifact in EOS imaging were most prevalent. This can affect the degree of measured scoliosis and mimic hardware or other gross anatomical distortion. Radiologists must be aware of these shortcomings when reporting EOS films as it impacts

management and may require repeat imaging. Due to the unexpected differences in thoracic and pelvic horizontal diameters, imaging standardization is required to improve reliability and monitor scoliosis via the Cobb angle which has proven variability.

Bibliography:

1. Melhem E, Assi A, El Rachkidi R, Ghanem I. EOS(®) biplanar X-ray imaging: concept, developments, benefits, and limitations. *J Child Orthop.* 2016 Feb 16;10(1):1–14.
2. Blumer SL, Dinan D, Grissom LE. Benefits and unexpected artifacts of biplanar digital slot-scanning imaging in children. *Pediatr Radiol.* 2014 Jul;44(7):871–82.
3. Simon A-L, Ferrero E, Larson AN, Kaufman KR. Stereoradiography imaging motion artifact: does it affect radiographic measures after spinal instrumentation? *Eur Spine J.* 2018 May;27(5):1105–11.

Thoracic spondylodiscitis as a rare complication of neonatal sepsis

Sofija Cvejic¹, Ivana Dasic¹, Tijana Radovic², Sandra Nedovic¹, Polina Pavicevic²

1. University Children's Hospital
2. University of Belgrade, Faculty of Medicine

Background: Infectious spondylodiscitis is a very rare entity in neonates, accounting for only a few percent of the bony infections in this population. It is most commonly caused by *S.aureus*, involving predominantly the lumbar region of the spine.

Case presentation: A female neonate was transferred from a regional hospital with a diagnosis of staphylococcal sepsis and a hyperechogenic mass in the right heart ventricle. The patient had high WBC count, CRP, D-dimer and low PLT count. Because of her critical condition, she was admitted to the ICU where she received adequate therapy. Surgery was performed to remove the infected thrombus in the right ventricle and the patient was discharged after two weeks, when the laboratory parameters were within the normal range. Three weeks later she came back with a COVID infection, fever and signs of pneumonia on radiography. She had high CRP and WBC count and received antibiotics again.

Results: Following radiographies showed complete regression of changes in lungs, but Th3 and Th4 vertebral bodies appeared destroyed, with loss of the intervertebral space. CT was performed for further evaluation and it confirmed that there were no pathological changes in lungs, but there was a visible destruction of three thoracic vertebral bodies with signs of soft tissue mass in the posterior mediastinum. MRI was suggested to evaluate contrast enhancement and involvement of the spinal canal. It showed an abscess formation located anteriorly and laterally to the spine with a complete destruction of Th3 vertebral body, subtotal destruction of Th2 and Th4 body and subsequent kyphosis. The spinal

canal was narrowed and the spinal cord was compressed at the level of kyphosis, without signal intensity changes. VATS was performed to evacuate the long standing abscess that proved to be caused by *S.aureus*. There were no signs of abscess on the control MRI and the kyphotic deformity was unchanged.

Conclusion: Because of the atypical presentation, the diagnosis of a neonatal infectious spondylodiscitis is usually delayed, leading to the extensive destruction of the affected vertebra and subsequent deformities.

Neuroradiology

Vitamin B12 Myelopathy

Dr Awab Ali¹, Dr Ehab Hamouda¹, Dr Kate Taylor-Robinson¹, Dr Nicholas Barnes¹

1. Alder Hey Children's NHS Foundation Trust

Purpose: To demonstrate the characteristic MRI features of Vit B12 deficiency myelopathy and differentiate it from other common causes of myelopathy like demyelinating diseases in paediatric population.

Methods: We present two cases in the paediatric population with vitamin B12 myelopathy. Case 1 had a functional Vit B12 deficiency due to Nitrous Oxide misuse and case 2 had a nutritional deficit. The cases were presented with a history of lower limb weakness, altered sensation of vibration and position. Case 1 also had an altered fine touch and pain sensory level. In both cases, there was a long segment of symmetrical high T2 signal in the posterior column of the cervicothoracic spinal cord. Case 1, with an altered sensory level for pain and fine touch, also had a symmetrically high T2 signal in the lateral spinal tracts. Case 2 had low Vit B12 blood levels. Case 1 had normal Vit B12 blood levels, but the history of Nitrous Oxide abuse and the typical MRI findings supported the diagnosis of Vit B12 myelopathy. Treatment has been started for both cases.

Conclusion: Vitamin B12 deficiency may present with neurological manifestations related to dorsal spinal cord involvement. It's important to recognise the characteristic MRI findings of symmetrical posterior spinal cord involvement. As the degree of resolution of the clinical symptoms in Vit B12 deficiency depends on early detection, MRI findings should not be missed.

Imaging Findings and Complications of Mastoiditis: A Review

Dr Brenna McInerney¹

1. The Grange University Hospital, NHS Wales

Objective: Mastoiditis is a common paediatric inflammatory condition affecting the mastoid air cells, which are located

in the temporal bone. Radiological imaging plays a crucial role in the diagnosis and management of this condition. The purpose of this review is to summarise the typical imaging findings, important complications and mimics of mastoiditis.

Findings: The most common imaging finding in mastoiditis is opacification of the mastoid air cells, which is typically seen on CT or MRI. Imaging findings can be categorised into intra- and extra-cranial and intratemporal pathologies. In severe cases, complications such as subperiosteal abscess, facial nerve palsy, and intracranial extension of the disease may occur, and we will discuss the imaging findings and mimics.

Conclusions: Radiological imaging is essential in the diagnosis and management of mastoiditis. The typical imaging findings of mastoiditis include opacification of the mastoid air cells, bone erosion, thickening of the mastoid bone, and soft tissue swelling. Complications such as subperiosteal abscess, facial nerve palsy, and intracranial extension of the disease may occur in severe cases. Recognition of these imaging findings and complications is important for prompt diagnosis and appropriate management.

Safety considerations for cranial ultrasound in neonatal brain imaging

Christina Eftychia Mavrou¹, Dr. Marina Papadaki

1. Tzaneio General Hospital of Piraeus

Cranial ultrasound (CUS) is the primary imaging modality in the assessment of the neonatal brain because of its imaging quality, safety, low-cost, and portability. In addition it is radiation-free and allows serial imaging. All professionals who perform CUS should be aware of biosafety indices, as it can lead to direct thermal and mechanical effects in sensitive, developing neural tissue such as the neonatal brain. During the procedure, the transducer is usually placed in the anterior fontanelle, in direct contact with the dura mater and bone interferes within the beam. The latter, increases the probability of temperature rise to adjacent to the bone tissues. Energy output should be kept as low as reasonably achievable. Output display standards consist of two indices: the thermal index (TI) and the mechanical index (MI). The TI is an indicator of the relative potential for thermal effects while the MI indicates the probability of mechanical effects within the tissue that is examined. The higher exposure intensities are associated with the pulsed Doppler mode. A lesser heating potential is associated with a low pulse repetition frequency. Contrast agents should be used with caution as they require a relatively high MI. Minimal time exposure is mandatory in order to minimise potential bioeffects. CUS is a valuable tool in the evaluation of neonatal brain and should only be performed by operators properly trained on ultrasound safety aspects. TI and MI are important indices,

but full awareness of the ultrasound machine settings is crucial in order to minimize risk factors. CUS duration should be kept as short as necessary to provide a diagnostic scan.

Frequency, Patterns and Intracranial Associations of Cystic Encephalomalacia on Delayed MRI Scans of Children with Cerebral Palsy due to Term Hypoxic Ischemic Injury

Dana Alkhulaifat, MD¹; Shyam Venkatakrishna, MBBS¹; Luis Octavio Tierradentro-Garcia¹; Mohamed Elsingerly, MD¹; Fikadu Worede, MD¹; Savvas Andronikou, MBBch, PhD^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, United States of America

2. Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, United States of America

Introduction: Cystic encephalomalacia develops in term perinatal hypoxic ischemic injury (HII) and is often referred to as catastrophic injury. However, imaging and associated findings of this condition have been poorly described. We aimed to define the different cystic patterns in children with term HII on MRI and determine the associated patterns of HII.

Methods and Materials: We retrospectively reviewed 1233 brain MRI reports of patients with diagnoses of term HII and identified patients diagnosed with cystic changes. These were classified as either *multi-cystic* or *focal* pattern, and each group was evaluated for associated injuries of the thalami, basal ganglia, hippocampi, cerebellum, and presence of ulegyria. We compared the frequency of injury involving the aforementioned locations between the two cystic encephalomalacia groups using Chi Square.

Results: A total of 388/1233 (31.5%) children with term HII had cystic encephalomalacia. 207/388 (53.3%) patients had focal cysts and 181/388 (46.6%) had multi-cystic injury. In the focal group there was thalamic injury in 87.9% (182/207), basal ganglia injury in 25.6% (53/207) and cerebellar involvement in 15% (31/207). A basal ganglia-thalamus pattern was present in 43.9% (91/207) and ulegyria in 69.6% (144/207).

In the multi-cystic group was thalamic injury in 88.9% (161/181), basal ganglia injury in 30.9% (56/181), and cerebellar involvement in 21% (38/181). There was a basal ganglia-thalamus pattern in 29.8% (54/181) and ulegyria in 28.7%. (52/181).

There was a significant association between the multi-cystic group and caudate involvement (OR, 1.9 [95% CI 1.2 to 3.3], $p=0.007$) and globus pallidus involvement (OR, 2.4 [95% CI 1.3 to 4.7], $p=0.007$). Focal pattern of injury demonstrated an association with the presence of ulegyria (OR, 0.18 [95%CI 0.12 to 0.28], $p<0.001$).

Conclusion: Cystic encephalomalacia is common (31.5%) in patients with term HII injury on delayed MRI, with similar prevalence of focal and multi-cystic injury. Cystic injury patterns, like other distributions of injury in HII, likely reflect duration and intensity of injury - multi-cystic injury was associated with caudate and globus pallidus involvement, typical of the BGT pattern of HII; the focal cystic pattern was associated with ulegyria, typical of watershed injury.

Evaluation of major intracranial artery Resistive Index in various degree of hydrocephalus

Dhananjaya Kotabagilu Narayana Vamyanmane¹, Ramesh R L², Naveen Benkappa², Niranjana, Pratheek², Uttam Shetty²

1. Sri Devraj Urs Academy of higher Education and Research Tamaka, Kolar, Karnataka, India.

2. Indira Gandhi Institute of Child health Benagluru, Karnataka, India

Purpose: Evaluation of Resistive Index (RI) in hydrocephalus.

Application of Resistive Index as marker tool for non-surgical management.

Establishing the standard value for considering surgical interventions in hydrocephalus.

Materials and Methods: Prospective study of neonates with various degree of hydrocephalus.

All the cases with mild, moderate and severe degree of hydrocephalus included in our study. V/H (Ventricle / maximum intracranial diameter) ratio used for assessing the degree of hydrocephalus.

Both communicating and non-communicating hydrocephalus were included.

Intracranial space occupying lesions, intraventricular hemorrhage, trauma and congenital anomalies of brain were excluded.

Duplex Doppler Ultrasonography of cranium done. Resistive index (RI) from Anterior cerebral and /or middle cerebral arteries were taken pre and post Tapping of CSF.

Statistical analysis was done for clinical significance.

Results:

- Total of 100 neonates were studied with inclusion criteria.

- There was a statistically significant positive correlation between degree of hydrocephalus and Resistive index (RI) in the MCA and/ or ACA.

- RI measurements with higher degree of hydrocephalus decreased significantly from a mean of 0.9 pre-tap to 0.7 post-tap.

Conclusion:

• Resistive index of ACA and / or MCA provides a reliable measure of cerebrovascular resistance in hydrocephalus.

• Clinical applications in Indication and timing of drainage procedure;

- Monitoring of effectivity of drainage procedure, detection of malfunction of external and internal drainage systems.
- Duplex Doppler ultrasonography thus is a useful noninvasive means of monitoring cerebrohaemodynamic change in infantile hydrocephalus.

Ultrasound Cranial Contents: A Review of Techniques and Pathologies

Emily Mayo¹, Zoe Nicholls¹

1. University Hospital of Wales, Cardiff, United Kingdom

Background: Normal ossification of the infant human skull occurs over the first 9–18 months of age. Fibrous suture fontanelles adjoin the two frontal, two parietal and single occipital bones, enabling child birth and brain development. As the high acoustic impedance of ossified bone limits assessments of underlying structures, the presence of these fontanelles provide an aperture readily accessible for ultrasound analysis of cranial contents. Ultrasound is preferable to CT and MRI due to its ready availability, low cost and lack of ionizing radiation.

Indications: In the neonatal setting, ultrasound is used in screening and follow up of germinal matrix haemorrhage and periventricular leukomalacia for preterm and extreme low birth weight infants (<1500g). While the fontanelles remain patent, it is often the initial investigation for suspected congenital anomaly, hypoxic ischaemic injury, infection, seizures, causes for abnormal head circumference including benign enlargement of the subarachnoid spaces or subdural fluid collections.

Serial cranial ultrasound is also used to assess for intracranial haemorrhage in neonatal patients undergoing extra corporeal membrane oxygenation support.

Technique: A small footprint probe, high-frequency phased array transducer (5–8 MHz) normally yields best images. Linear probes (7.5MHz) can provide additional high resolution images. There may be technical challenges in positioning the probe, particularly for patients in incubators with multiple lines and tubes inserted. Distressed outpatients can also be challenging and help may be needed to maintain optimal head position.

The anterior fontanelle enables coronal assessment from the frontal to occipital lobes, and sagittal assessment of the midline, right and left hemispheres. Colour Doppler can assess vascular structures for pathology e.g. superior sagittal sinus thrombus. Depth, gain and focus settings should be optimized for best images.

Various measurements can be taken to assess degree of any hydrocephaly including coronal dimensions of the frontal horns at the level of the third ventricle, third ventricle width, thalamo-occipital distance.

Examples of pathologies: Large intraventricular germinal matrix haemorrhage with mass effect, later maturing to porencephalic cysts.

1. Lenticulostriate vasculopathy
2. Benign enlargement of subarachnoid spaces.

Pediatric Extra-ventricular Neurocytoma: The Often-forgotten Differential Diagnostic Consideration in Pediatric CNS tumors

Fabricio Guimaraes Goncalves¹, Carmen Cerron-Vela¹, Youck Jen Siu Navarro¹, Angela Viaene¹, Mariarita Santi¹, Savvas Andronikou¹, Arastoo Vossough¹, Karuna Shekdar¹

1. Children's Hospital of Philadelphia

Purpose/Objective/Background: Extraventricular neurocytoma (EVN) is a rare type of neuronal tumor that arises outside of the ventricular system and most commonly seen in adults. Despite exhibiting histopathological features similar to those of intraventricular central neurocytoma, EVNs may display a wide range of morphological variations and are often associated with frequent FGFR1:TACC1 fusions. EVNs are classified as grade 2 tumors by the World Health Organization. In this study, we evaluated the imaging characteristics of EVNs in pediatric patients.

Materials & Methods: We conducted a retrospective imaging review of nine consecutive cases of pathologically confirmed pediatric extraventricular neurocytoma (EVN) treated at a single center from 2008 to 2022. Detailed MR imaging features were reviewed, along with CT features, when available. Additionally, genotyping information was assessed wherever possible.

Results: Nine patients (7 male; 78%) were evaluated. Eight cases were in the cerebrum and one in the spinal cord. The most common clinical presentations were seizure (33%) and headaches (22%). The most common locations were frontal (33%) and parietal lobes (22%). Cortex was involved in 44% and white matter in 67%. All were T2 hyperintense and 89% were T1 hypointense. Enhancement was seen in 89% of cases. A solid lesion was seen in 56% of cases and a cystic lesion with an enhancing nodule was seen in 44% of cases. Susceptibility (blood/calcium) was seen in 67% of cases. None exhibited diffusion restriction. Little to no mass effect was observed in 55% of cases and moderate/severe in 45%. Focal bone remodeling was seen in 33% of cases.

Conclusions: Pediatric EVN is a rare neoplasm with a range of imaging appearances and typically presenting with seizures or headaches during middle childhood and adolescence. They are generally solitary frontoparietal lesions with variable size and a solid or cystic-solid appearance often exhibiting mild to moderate peritumoral edema/mass effect and susceptibility artifacts (blood/calcifications). EVNs

should be considered in the differential diagnosis of solitary solid/solid-cystic, hemorrhagic/calcified, enhancing lesions in school-age children. Although no definitive features have been identified, recognition of these imaging characteristics can aid in the accurate diagnosis and management of EVN in pediatric patients.

Advanced MRI sequences in pediatric neurovascular diseases. A comprehensive review

M. Ibnoulkhatib¹, M. Gómez-Chiari², J. Muchart³, J. Wieckowski⁴, M. C. Planells Alduvin⁵, V. Gonzalez Alvarez⁶, C. J. Garcia⁷, I. Barber⁸, J. Munuera⁹

1. Hospital Vall d'Hebron. Barcelona/ES
2. M. Gómez-Chiari. Hospital Sant Joan de Deu. Barcelona/ES J.
3. Muchart Hospital Sant Joan de Deu. Barcelona/ES J.
4. Wieckowski Hospital Sant Joan de Deu. Barcelona/ES
5. M. C. Planells Alduvin Hospital Sant Joan de Deu. Barcelona/ES
6. V. Gonzalez Alvarez Hospital Sant Joan de Deu. Barcelona/ES
7. C. J. Garcia Hospital Sant Joan de Deu. Barcelona/ES
8. I. Barber Hospital Sant Joan de Deu. Barcelona/ES
9. J. Munuera Hospital Sant Joan de Deu. Barcelona/ES

Purpose/Objective/Background: We currently have a large range of techniques available in contemporary neurovascular practice. The aim of this study is to highlight and analyze the different advanced MRI sequences, in pediatric neurovascular diseases.

Memthods: This study is a retrospective review of 200 patients with neurovascular pathology. They were studied with 3 Tesla MRI using advanced MRI sequences for their vascular study.

Results: We report illustrative cases diagnosed in our center of vascular pathology with advanced MRI sequences including patients with PHACES syndrome, moya moya disease, cerebral proliferative angiopathy, arteriovenous malformations, arteriovenous fistula, pial arteriovenous fistula, aneurysms and ischemic stroke.

This patients were studied with triggered angiography non-contrast-enhanced magnetic resonance imaging (TRANCE-MRI), Arterial Spin Labelling (ASL), Relaxation-Enhanced Angiography without Contrast and Triggering (REACT), MRI with acetazolamide administration and susceptibility sensitive sequences. We here explore the diagnostic performance of the different advanced MRI sequences, used in each case, for the evaluation of the vascular pathology. Then we compare the efficacy of these techniques in order to define in which case each of the methods is indicated.

Conclusions: Advanced MRI sequences are necessary to characterize neurovascular lesions and can be used as an

alternative and objective tool for assessing vascular suspected pathology. Moreover, it is a non-invasive diagnostic tool. Using these diagnostic techniques, specially in pediatrics, is useful and can sometimes avoid using more invasive techniques such as arteriography.

Frequency and distribution of Perinatal arterial ischemic stroke in a cohort of patients with Cerebral Palsy using Delayed MRI

Mohammad Jalloul MD¹, Shyam Sunder B Venkatakrishna, MBBS¹; Savvas Andronikou, MBCh, PhD, PhD, FRCR, FCRad (Diag)¹

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, United States of America

Background: Perinatal arterial ischemic stroke [PAIS] describes disruption of cerebral blood supply focally, between 20 weeks gestation to 28 postnatal days, usually confirmed on neuroimaging. Usually the middle cerebral artery (MCA) is involved, usually unilateral on the left. Watershed (WS)infarcts are distinct from PAIS. We aimed to characterize distribution and associated injuries in children with PAIS on delayed MRI in a database of children with Cerebral Palsy and suspected term hypoxic ischemic injury (HII).

Materials and Methods: Retrospective review of MRI scans in children (0-18 years) with CP and suspected term HII, including reports with keywords: PAIS, stroke, infarct, infarction. Infarct side and location were recorded along with associated cystic changes, ulegyria, deep nuclei lesions, or additional WS HII.

Results: Of 1620 children with CP, 15 (1%) had PAIS with mean age of 6.07 years [SD: 4.01 with age range of 2 – 17 years] compared to 1175 (73%) with term HII. Infarcts were unilateral in 14 (93%) - 9 left-sided (60%), and 5 right-sided (33%) - and bilateral in 1 (7%), with a larger left infarct. In addition to PAIS, there were cystic changes in 10 (67%), ulegyria in 1 (7%) and concomitant HII in 7 (47%) - BGT (basal-ganglia-thalamus) pattern in 3 (20%), watershed (WS) pattern in 2 (13%), and a combined BGT/WS pattern in 2 (13%). In the absence of a BGT HII, deep nuclei injuries were present in 6 children (40%) - thalamic in 5 (33%); putamen and globus pallidus in 3 (20%); caudate in 2 (13%). The MCA was the only injury site in 13 (87%) [left 7 (47%); right 5 (33%) bilateral in 1 (7%)]; ACA and the PCA were affected in 1 child (7%) each (left in both).

Conclusion: Only a small proportion (1%) of patients imaged to determine the cause of CP had PAIS. The most common location of infarct was the left MCA. Almost half (47%) of children had accompanying HII including BGT HII (20%), WS HII (13%), and combined HII (13%).

Acute necrotizing encephalopathy following Influenza A viral infection: a case report

Nataša Milčanović¹, Živana Cvijan-Stevančević¹

1. University Children's Hospital

Background: Acute necrotizing encephalopathy (ANE) is a rare neurological disease that most commonly affects previously healthy children. It is most prevalent in East Asia, but has been reported in other parts of the world. Influenza A is a leading cause of ANE.

Methods: We present a case report of ANE in previously healthy child as a complication of acute respiratory infection caused by Influenza A virus. Clinical characteristics, laboratory investigations as well as radiological features has been described.

Materials: We used well known specific criteria for diagnosing ANE including: 1) acute encephalopathy following febrile viral infection, convulsions and deterioration in the level of consciousness; 2) elevation of serum transaminase; 3) increased cerebrospinal fluid proteins without pleocytosis; 4) typical neuroimaging findings; 5) exclusion of resembling diseases.

Results: Our case qualified all the criteria for diagnosing ANE. The patient was previously healthy 15-month-old boy with reported history of fever (40°), vomiting and diarrhea one day prior to hospitalization. He was admitted after recurrent convulsions and rapid deterioration in the level of consciousness. Laboratory investigations showed elevated levels of liver transaminase and C-reactive protein while there were low level of leukocytes and lymphocytes. Lumbar puncture was performed on the day of admission, which showed slightly elevated cerebrospinal fluid protein and glucose without pleocytosis. Multiplex PCR respiratory panel test were positive for Influenza A virus. Head computed tomography examination at the time showed multiple, symmetric hypodense supra and infratentorial lesions in both thalami, dorsal pons and cerebellar white matter without postcontrast enhancement. Three days after hospitalization, magnetic resonance imaging was performed. There were typical multifocal, symmetric, T2W/FLAIR hyperintense, T1W hypointense lesions with restrictive diffusion and without postcontrast enhancement. Bilateral thalami, putamina, posterior limbs of capsule interna, periventricular and deep cerebral white matter, cerebellar white matter and brain stem tegmentum were affected. Thalami showed microhemorrhage as well. Thus, the patient was diagnosed with ANE.

Conclusions: ANE is a rare neurological complication of viral infection in children, but we should be aware of clinical, laboratory and radiological criteria in order to adequately diagnose this entity.

Perineural arachnoidal Gliomatosis: A Unique Growth Pattern In A Patient Without Neurofibromatosis Type-1

Omer Faruk Simitcioglu¹, Eda Almus¹, Mustafa Hurmuzli¹, Özge Yapıcı¹

1. Marmara University School Of Medicine, Department Of Radiology

Background: Optic nerve gliomas are low-grade neoplasms occurring in pre-cortical visual pathways. This pathway includes the optic nerve, optic chiasm, optic tracts, optic radiations, and hypothalamus. This entity can arise sporadically or due to neurofibromatosis type-1 (NF-1). Optic nerve gliomas are classified into two groups, intraneural and perineural, according to their growth patterns. Intraneural optic gliomas, the most common type, invade through intraneural fascicles. Whereas in the perineural type, called perineural arachnoidal gliomatosis (PAG), leptomeninges is invaded and neoplastic cells proliferate in subarachnoidal space while the optic nerve remains unaffected. PAG is seen almost exclusively in NF-1 patients. We present an exceedingly rare case of optic nerve glioma with PAG who has not been diagnosed with NF-1.

Case Presentation: 5 year-old male without any past medical history presented to the pediatric outpatient clinic with recent proptosis in the right eye. His examination has failed to show any abnormalities except for right proptosis. His left optic nerve was atrophic on ophthalmologic examination. Afterward, the patient underwent an orbital magnetic resonance imaging (MRI). MRI scan revealed expansion and contrast uptake in the right optic nerve as well as encasement of the nerve by soft tissue. The optic nerve also showed tortuosity. The optic nerve lesion did not show diffusion restriction. According to our hospital's protocol, a brain MRI scan was done, which failed to show any intracranial pathology. The patient's parents refused to give consent for further workup and biopsy. Based on the MRI findings, an optic nerve glioma with PAG was diagnosed. Afterward, chemotherapeutic treatment is given. Informed consent was obtained from the patient's parents.

Conclusion: In conclusion, PAG is a subtype of optic nerve glioma primarily seen in NF-1 patients. Nonetheless, as in our case, PAG is not an NF-1 exclusive entity. A differential diagnostic list of the orbital tumors is of great value in PAG due to overlapping radiological features and nonspecific clinical symptoms. Pseudo-CSF sign can help diagnose PAG.

Imaging of Mastoiditis and its Complications in Paediatric Population

Rusul Yonis¹, Dr.Ghadir Kassab¹

1. Department of Radiology at Alder hey children's hospital - NHS

Introduction: Mastoiditis is a commonly encountered condition in paediatrics with an array of very sinister complications. Therefore, it is crucial for radiologists to be well versed in diagnosing mastoiditis.

Aim: An educational poster aiming to give an overview of mastoiditis, focusing on the imaging modalities used in diagnosing the pathology and its complications by exhibiting several images from cases encountered recently in practice at Alder Hey Children's Hospital.

Overview of the poster: Mastoiditis is the most common and serious complication of acute otitis media. It is primarily a pathology of the paediatric population, and most frequently result from bacterial infections, with *Streptococcus pneumoniae* and *Haemophilus influenzae* accounting for 65-80% of cases.

Radiological diagnosis: Imaging is the corner stone of diagnosing mastoiditis and its complications. Contrast enhanced Computed tomography (CECT) is the initial investigation of choice used to classify the mastoiditis as incipient or coalescent and to detect intracranial complications such as cerebral abscesses and dural venous thrombosis.

Magnetic resonance imaging (MRI) is performed in patients with clinical symptoms or CT findings suggestive of intracranial complications because of its higher sensitivity for detection of extra-axial fluid collections, cerebritis, and associated vascular problems.

Conclusion: In summary, mastoiditis is a common pathology readily seen in paediatric practice with serious and fatal sequelae. Therefore, it is imperative for radiologists to keep a low suspicion index and to be proficient at diagnosing mastoiditis and its complications to allow early intervention.

Imaging of anophthalmia – a case study

S.Mladenovic¹, V.Stokanovic¹

1. Department of radiology, Clinical centre Nis

Background: Anophthalmia represents a congenital disorder manifested by complete absence of the eye and is often associated with aplasia of orbital structures, such as the optic nerve or oculomotor muscles, the chiasma and optic pathway. Studies have linked anophthalmia with various etiological factors, environmental and genetic, both groups affecting the first 8 weeks of prenatal life. In embryological terms, this disorder occurs as a result of developmental failure of the anterior neural tube or optic pit.

Anophthalmia can be unilateral or bilateral; primary, in most cases of genetic etiology, with agenesis of the globe, or secondary, in which case the globe/bulbar tissue can be present, but extremely hypoplastic, measuring below the 5th percentile. Imaging, aside from clinical examination and genetic research, is an inseparable part of the diagnostic process, also allowing physicians to distinguish whether anophthalmia is isolated, or a part of a syndrome. Hence different imaging modalities – ultrasound, CT or MRI enable prenatal and postnatal diagnosis of orbital pathology and associated craniofacial, cardiac or abdominal anomalies.

Objective: MRI is the modality of choice in prenatal and postnatal diagnosis. Main advantages of MRI imaging include high sensitivity and specificity, which enable a detailed insight in orbital and adjacent abnormalities, as well as the fact that this modality allows radiation – free imaging, a major bonus in pediatric patients.

Results: We present a case of a 9-year-old male patient, without prior medical history. Clinical examination was highly suggestive of bilateral anophthalmia and could not exclude other potential developmental anomalies. An MRI examination of the head was performed using 3T Philips MRI scanner, following the standard endocranium protocol and focused orbital tomograms. Analysis of the obtained tomograms showed a case of isolated bilateral anophthalmia.

Conclusion: MRI is a powerful tool that gives insight in orbital pathology, taking part both in prenatal and postnatal assessment of this pathological entity and is a preferred diagnostic modality when available.

MR imaging in children with pituitary endocrinopathies

Denić Saša¹, Golubović Milan², Stokanović Vesna³, Milena Trandafilović¹, Spasić Jelena³, Stojanov Dragan³

1. Faculty of Medicine, University of Nis, Serbia

2. Clinic of pediatrics, University clinical center Niš, Serbia

3. Center for radiology, University clinical center Niš, Serbia

Purpose/Objective/Background: Magnetic resonance imaging (MRI) is the modality of choice for evaluation of pituitary anatomy and morphological alterations. The objective is to present our findings in children with endocrinopathies who underwent MRI examination of pituitary gland during the last 3 years. Additionally, we describe typical MRI findings of pituitary disorders we encountered.

Methods: This is a retrospective study that analyzed MRI findings of pituitary gland in pediatric population. The examinations were performed on Philips Integra 1.5 T and General Electronics 3T MRI scanner. T2-weighted, T1-weighted (T1w) and T1w contrast enhanced images in two planes were obtained.

Materials: This study included patients 0-18 years of age with laboratory confirmed hormonal imbalance or clinical signs of pituitary disease who underwent pituitary MRI examination in Center for radiology, University clinical center Nis from January 2020 until March 2023.

Results: Total of 61 subjects were identified (36 girls and 25 boys, mean age 13.1) and majority of them were teenagers (65.6%). Dominant hormonal changes were growth hormone and prolactin imbalance. Most of patients clinically presented with symptoms of hypopituitarism, growth failure, delayed puberty, precocious puberty and diabetes insipidus. Abnormal findings were

as follows: microadenoma in 13, pituitary hypoplasia in 8, macroadenoma in 3 and absent posterior pituitary in 2 patients. We recorded one case of pituitary apoplexy, one arachnoid cyst of suprasellar region and two cases of hypophysitis. One patient presented with cystic pituitary adenoma.

Conclusion: Our study showed a variety of MRI structural pituitary anomalies in children with endocrinopathies. Although half of the patients showed normal MR morphology, imaging of pituitary-hypothalamic axis is essential diagnostic method in assessing local anatomy and underlying etiology. These findings in correlation with laboratory and clinical presentation lead to correct treatment and evaluation of the severity of endocrine-related disorders.

Managing a Complex and Challenging Case of Severe Occipital Meningoencephalocele and Obstructive Hydrocephalus: A Multidisciplinary Approach

Valentina Ferrer Valencia¹, Gustavo Adolfo Triana Rodriguez², José David Cardona Ortégón², Angela Patricia Guarnizo Capera²

1. Universidad El Bosque
2. Fundación Santa Fe de Bogotá

Background: Severe occipital meningoencephalocele and obstructive hydrocephalus requires an integrated approach. Accurate classification of the severity of the condition is crucial for diagnosis, treatment, and prognosis.

Case Presentation: A male patient was diagnosed prenatally with interhemispheric cyst and occipital meningoencephalocele and presented with obstructive hydrocephalus. Brain imaging revealed macrocephaly, absence of the septum pellucidum, and dysgenesis of the corpus callosum. The patient underwent ventriculo-peritoneal shunt placement, and follow-up imaging studies confirmed appropriate shunt placement and correction of meningoencephalocele, as well as a decrease in ventricular size. The severity of the patient's condition was attributed to alobar holoprosencephaly, a structural anomaly of the brain resulting from incomplete forebrain division during early gestation.

Conclusions: The successful management of complex cases of severe occipital meningoencephalocele and obstructive hydrocephalus requires multidisciplinary treatment involving neurosurgeons, radiologists, and neonatologists. Accurate classification of the severity of the condition is crucial for diagnosis, treatment, and prognosis. Timely and appropriate intervention, including surgery and follow-up imaging studies, is essential for patients' well-being and long-term prognosis. This case highlights the importance of such an approach in managing these challenging cases.

MR fingerprinting at child brain

Zorica Joković¹, Marija Mijaljević², Nevena Lazović¹, Dušan Banovac¹

1. Department of Radiology, University Children's Hospital, Medical Faculty, Belgrade, Serbia
2. Department of Radiology, Institute of Oncology and Radiology of Serbia, Medical Faculty, Belgrade, Serbia
corresponding author dr.z.jokovic@gmail.com

Background: Only a few, deep learning algorithms have been applied to infant magnetic resonance imaging (MRI). The reason is that the tissue is inhomogeneous appearance because the imaging intensity is variable during the first year of life. This paper reviews the basic concept of MR fingerprinting (MRF) in the developing, neonatal brain. MRF is a fast, multiparametric quantitative imaging. Nearly any sequence can be used in MRF acquisition, and multiple sequences can be combine in a single acquisition. Usually used sequences are T1-weighted (T1w), and T2-weighted (T2w) for mapping. The MRF techniques have been mostly validated using phantoms.

Methods: We used PubMed, Google Scholar, and Medline as bibliographic databases containing many journal articles. The keywords were MR fingerprinting, MRF, neonatal, pediatric, and child's brain. The filter was only human.

Results: We found 22 papers, but only 6 papers satisfied these keywords. Most of them were about preterms and only one was about quantitative measurements in the first five years of life. For MRF they used T1w, and T2w for quantitative tissue mapping and myelin water fraction (MWF) for developing the brain during the time. MRF includes signals from wide ranges of T1 (60 to 5000ms) and T2 (10~500ms) values. All 28 children, ages from 2-60months were enrolled in the UNC/UMN Baby Connectome Project. Quantitative T1 and T2 maps were generated simultaneously, and it need ~34 sec. while calculating MWF maps ~9 sec. Quantifications of T1, T2, and MWF were obtained in children's brains with performed the region of interest (ROI) analysis of the white matter. They found the age-related differences in relaxivities that follow the logarithmic model, while the MWF pattern exhibits negligible values until 6 months of age, and gradually increases. Tissue relaxation properties change very fast because reflecting the physiological changes in early brain development.

Conclusions: This paper found that MRF techniques have great potential as a multi-parametric assessment of normative brain development in the early years of life. Also, there is a potential for measurement of MWF in brain development anomalies.

Significance of multicomponent T2 relaxometry in pediatric neuroimaging

Zorica Joković¹, Dušan Banovac¹, Nevena Lazović¹

1. Radiology department, University Children's Hospital, Belgrade, Serbia

Background: The term relaxometry was introduced in 1986, by Koeng et al. And since then, it has been widely used to quantify various biophysical characteristics of different tissues, thereby removing biases during qualitative interpretation and enabling more accurate follow-up. T2 relaxometry represents a measurement of T2 relaxation rate in the area of interest by creating a map, generally using spin-echo sequences with two or more different times of echo (dual-echo or gradient echo sequences) with corresponding signal intensities and a long time of repetition (vary between various studies, usually in the range of 3000 - 10000 ms) as parameters.

The purpose of our study is to unify all existing clinically relevant papers considering the usage of T2 relaxometry in pediatric neuroimaging into one coherent and potentially usable study.

Materials and methods: We gathered our material through research of available online medical libraries such as PubMed and Google scholar, for papers published in the English language in the past 10 years, respectively, with keywords beginning: T2 relaxometry, human, pediatric, brain disease, and neuroimaging.

Results: Through our research, we found several relevant papers, mostly cross-sectional, smaller cohort studies, in which T2 relaxometry was used as prediction and follow-up method. A special challenge is the follow-up of children under the age of two, in whom the normal T2-relaxation values of the white matter (major and minor forceps $T2=404.4\pm 8.1$ ms, corpus callosum $T2=228.6\pm 3.6$ ms) differ significantly from those of adults ($T2\sim 80-90$ ms) due to the myelination. This is important for predicting and detecting many conditions and diseases affecting white matter, such as childhood absence epilepsy, cerebral palsy, and assessment of brain maturity in preterm infants. T2 relaxometry was also used in: Friedreich's ataxia, seizure outcome in solitary cerebral cysticercosis, brain abnormalities in patients with single ventricle heart disease, and differentiation in brain ring lesions.

Conclusion: There are not many published studies regarding T2 relaxometry in pediatric neuroimaging, however, through our literature review, those that do exist, show great promise in the use of this method in a variety of

pathologic findings including infectious, metabolic, congenital, and extracerebral diseases and conditions affecting the brain.

Oncology

Pleuropulmonary Blastoma (PPB): Clinical case report

Dr. Dusan J. Petrovic (M.D.)¹, Prof. Dr. Pavicevic Polina (M.D., Ph. D.)²

1. Department of Diagnostic Imaging, Center of Radiology and MRI, Clinical Center of Serbia, University of Belgrade, School of Medicine, No. 2 Pasterova Street, Belgrade 11000, Serbia, Phone: +381648742761, email: dusanpetrovic736@gmail.com

2. University Children's Hospital, Belgrade, Serbia, email: pzmbov@yahoo.com

Pleuropulmonary blastoma (PPB) is a very rare tumor of the chest seen predominantly in young children with great heterogeneity and clinical, biochemical, and biological complexity and recognized, described, and classified as distinct from the pulmonary blastoma typically encountered in adults. Unfortunately, it has a poor prognosis and is mainly classified as cystic (type 1), mixed type (type 2), and solid (type 3). Herein, we present one case of PPB type 2 presenting clinically with a right pulmonary abscess, a rare clinical presentation of PPB, which was initially treated with surgery, and after approximately one year of follow-up, pulmonary rest-recurrence and central nervous system secondary deposits were detected. When a large pleural-based mass is identified in a young child, PPB should also be considered, especially in a patient with a positive oncological family history. Suggestive findings include the absence of chest wall invasion, presence of pleural fluid, right-sided location, and heterogeneous native (NECT) low attenuation with variable postcontrast enhancement. The authors believe that a modern therapeutic approach should take these results into consideration for a better understanding of the genetic nature and complex mechanism and process of PPB disease development (both clinical and preclinical data concerning PPB pathophysiology are still lacking and are not completely understood), so that it would be possible to establish new possible therapeutic options (i.e. nuclear medicine theranostics in PPB treatment) and approaches, and so that, given the severity of the disease, it would be possible to indicate the importance of genetic testing and counseling of close relatives.

Keywords: Pleuropulmonary blastoma type 2, right pulmonary abscess, thoracotomy, DICER 1 syndrome.

Very rare but characteristic ultrasound appearance of bilateral multiple large-cell calcifying Sertoli cell tumor of the testis in an adolescent

Ercan Ayaz¹, Nurettin Okur², Selver Özekinci³

1. Department of Radiology, Diyarbakır Children's Hospital, Diyarbakır, Türkiye

2. Department of Pediatric Oncology, Diyarbakır Children's Hospital, Diyarbakır, Türkiye

3. Department of Pathology, Dicle University Medical School, Diyarbakır, Türkiye

Background: Sex cord-stromal tumors constitute 2-5% of all testicular neoplasms and one of the rarest types of this group is large-cell calcifying Sertoli cell tumor (LCCSCT). Our aim is to represent a case of bilateral multiple LCCSCT with typical ultrasound findings.

Case Presentation: A 16-year-old male patient was admitted to our clinic with scrotal pain and focal firmness in the scrotum. On physical examination, small masses were palpated in both testes. The hormone levels (testosterone, FSH and LH) and tumor markers were within the normal range as; alpha-fetoprotein (AFP) 0.9 ng/mL, β -Hcg: 0.1, and LDH: 148 U/L. On ultrasound (US), bilateral multiple testicular masses, including extensive coarse calcifications were demonstrated. The largest mass was measured at 12x9 mm on the right and 13x10 mm on the left testis. The volumes of the testes were normal by age as 11.3 cm³ for the right and 11.5 cm³ for the left testis. Other intrascrotal structures were normal, and there was not any extratesticular lesion. Since the masses involved the majority of both testes, surgical excision could not be performed. Instead, a core needle biopsy was carried out from both testes. Histopathologic examination revealed large neoplastic cells, including granular cytoplasm and giant oval nuclei. Cells were organized in a pattern of solid cords and islets. Extensive calcifications were seen within the tumor, and some of those had psammoma bodies. Immunohistochemical tests showed positivity for calretinin and inhibin; absent reactivity for cytokeratin 5/6, SALL4, and CD117. These findings confirmed the diagnosis of LCCSCT. At the 6, 12, and 18 months of follow-up examinations, the patient was asymptomatic, tumor markers were normal, and lesions were grossly similar.

Conclusion: Pediatric testicular tumors are rare, most of which are germ cell tumors. The vast majority of them are solitary, and ultrasound findings are non-specific. LCCSCTs occur with a frequency of 0.4–1% pediatric testis tumors. Among these tumors, 20-30% are bilateral and multiple. Ultrasound features of LCCSCT are characteristic of multiple solid lesions, including extensive calcifications. Bilateral

multiple tumors almost always show a benign course; therefore, defining the diagnosis with sonographic findings is very important.

Giant desmoid fibromatosis after hip luxation surgery—imaging characteristics

Ivana Dasic¹, Sofija Cvejic¹, Tijana Radovic¹, Jelena Lazic¹, Polina Pavicevic¹

1. University Children's Hospital, Belgrade, Serbia Faculty of Medicine, University of Belgrade

Background: Desmoid tumors are rare soft-tissue neoplasms, especially in children. Although they do not have metastatic potential, they can exhibit aggressive growth and local invasion. Possible association with the familial adenomatous polyposis (FAP) is described, but also the history of previous injury or surgery. The most common localization of extra-abdominal pediatric desmoid tumors are the extremities, followed by the head and neck region, and the rarest location is within the abdominal wall. Multiple treatment plans have been proposed in children.

Case presentation: An 11-year-old girl was admitted to the University Children's Hospital in Belgrade due to a large painless mass above the left iliac crest. The mass was observed to be firm, non-tender and fixed to the abdominal wall. Parents stated that the mass was gradually increasing in size over the past year. The girl had surgery on her left hip four years ago in another institution. Laboratory findings and tumor markers were within normal limits.

Ultrasound (US) revealed the presence of a large heterogeneous tumor formation, measuring about 10 cm with pronounced vascularization with color doppler and close contact with the left iliac bone. In order to evaluate the bone structures and intra-abdominal propagation, a CT scan of the pelvis and hips as well as MRI of the abdomen and pelvis was done. CT-scan shows low-attenuation mass permeated with numerous irregular, slightly hyperdense septa and diffuse inhomogeneous enhancement after contrast agent administration. On MRI large tumor mass was relatively clearly defined with lobulated appearance, localized at the level of the musculature of the lateral wall of the abdomen, between the outer and inner oblique muscles, with diffusion restriction and moderate inhomogeneous postcontrast opacification.

Results: Surgical biopsy was done and histological diagnosis was desmoid fibromatosis. After chemotherapy there was no tumor regression and due to the size of the mass, radical resection was performed. The patient remains in good health and complete remission without any other treatment following surgery.

Conclusion: The diagnosis of desmoid fibromatosis should be considered in patients with an abdominal wall mass with a history of previous surgery or injury. Unlike other localization, the therapy of abdominal wall desmoid tumors remains aggressive and includes complete surgical resection.

Radiologic imaging findings in graft versus host disease in children

Joanna Abi Ghosn¹, Karim Bergaoui¹, Fanny Falaque², Asma Louati¹, Carmen Ioana Lung¹, Alexandra Ntorkou¹, Anca Tanase¹, Marianne Alison¹.

1. Department of Pediatric Radiology, Hôpital Robert Debré
2. Department of Pediatric Immunology and Hematology, Hôpital Robert Debré

Purpose: Illustrate the presenting symptoms and describe common imaging findings in clinically suspected GVHD to guide urgent treatment.

Material and methods: A review of the common imaging findings in most involved systems in GVHD will be presented.

Cases of GVHD have been extracted from our data base, and most interesting cases will be presented.

Results: Imaging is indicated once GVHD is suspected after haematopoietic stem cell transplantation, a serious complication mostly involving the skin, gastrointestinal tract (mainly small bowels and liver) and pulmonary system.

Radiological findings are non specific, but common imaging features can suggest the diagnosis, assess disease severity, and guide the appropriate management.

Imaging is also essential to exclude other potential complications after haematopoietic stem cell transplantation (infections, hemorrhage, etc...).

Conclusion: Radiologists should be aware of the common imaging findings of GVHD, thus suggesting promptly the diagnosis and guide management.

References:

1. Pandey T, Maximin S, Bhargava P. Imaging of complications from hematopoietic stem cell transplant. *Indian J Radiol Imaging* 2014;24:327-38.
2. Meghan G. Lubner, Christine O. Menias, Michelle Agrons, Kinan Alhalabi, Venkata S. Katabathina, Khaled M. Elsayes, et Al. Imaging of Abdominal and Pelvic Manifestations of Graft-Versus-Host Disease After Hematopoietic Stem Cell Transplant. *American Journal of Roentgenology* 2017 209:1, 33-45
3. Noninfectious Pulmonary Complications after Hematopoietic Stem Cell Transplantation: Practical Approach to Imaging Diagnosis. Elena Peña, Carolina A. Souza, Dante L. Escuissato, Marcio M. Gomes, David Allan, Jason Tay, and Carole J. Dennie. *RadioGraphics* 2014 34:3, 663-683

4. Musculocutaneous Chronic Graft-Versus-Host Disease: MRI Follow-Up of Patients Undergoing Immunosuppressive Therapy. Marius Horger, Wolfgang Bethge, Andreas Boss, Michael Fenchel, Claus D. Claussen, Marc Schmalzing, and Wichard Vogel. *American Journal of Roentgenology* 2009 192:5, 1401-1406.

Inflammatory myofibroblastic tumor of the urinary bladder in 13-year-old girl

Dr. Małgorzata Szorc¹, Dr. Kinga Kowalczyk¹, Prof. Elżbieta Jurkiewicz¹

1. Children's Memorial Health Institute

Introduction: Inflammatory myofibroblastic tumor (IMT) is a rare intermediate soft tissue tumor arises from various organs, such as the lung, omentum, abdominal cavity, and retroperitoneum. In 2020, the WHO reclassified IMT as a specific tumor form in the category of intermediate (rarely metastasing) fibroblastic/myofibroblastic tumors. IMT of the urinary bladder is extremely rare comprising less than 1% of all bladder tumors. Bladder IMTs are more frequently found in young women than in men and are rare in children. Surgical resection is the treatment of choice and the prognosis of IMTs of bladder is relatively good.

Case report: We describe a case of bladder IMT in a 13-year-old girl who presented to the urologist complaining of recurrent dysuria, hematuria and lower abdominal pain. Urine samples showed erythrocyturia and proteinuria.

Ultrasonography revealed a 37x30x30mm heterogeneous mass located in the upper anterior wall (below urachus) with signs of internal vascularity in Color Doppler CD and SMI (superb microvascular imaging). The urologist suggestion was at first inflamed urachus.

Contrast enhanced ultrasound (CEUS) showed strong enhancement in early arterial phase and irregular but fast wash out what exclude diagnose of inflamed urachus and lead us to suspicion of malignant tumor.

Pelvic MRI demonstrated the 37x27x 27mm broad-based mass, suggesting submucosal tumor in the wall of the bladder. The mass showed low-to-moderate signal intensity on T1-weighted images and slight high signal intensity on T2-weighted images and restricted diffusion with low signal intensity on ADC map and abnormal high signal intensity on DWI. After contrast injection enhancement was irregular, what suggested the possibility of leiomyoma.

The tumor was removed within healthy tissues, microscopically: inflammatory myofibroblastic tumor.

An oncogenetic study was ordered - the result is still in development.

Conclusion: IMT is a borderline tumor with generally good prognosis but up to 35% may recur and distant metastasis may occur. Therefore, periodic follow-up examinations are required.

Atypical manifestations in CNS in children with leukemia

Mariana Planells Alduvin¹, Jordi Muchart López¹, Anna Faura Laura Arques¹, Jaroslaw Smiechowicz¹, Marta Gomez-Chiari¹

1. Hospital Sant Joan de Deu

Purpose: The purpose of this study is to present atypical findings of CNS manifestations due to leukemia in children at the moment of diagnosis or during treatment.

Methods and materials: We did a revision of atypical findings due to leukemia in our hospital.

Results: By direct or hematogenous spread, leukemic cells can infiltrate virtually any anatomic location.

Due to the rise in survival rates, the frequency of central nervous system infiltration and complications has increased. The manifestations in the central nervous system seen in leukemia may involve the leptomeninges, brain parenchyma, cerebral vasculature or the bone structure.

The most common neuropathology in our series was leukemic meningitis. Leukemic involvement of the subarachnoid space can be identified in MRI as abnormal enhancement of the meninges and nerve roots. More rarely we had patients with nerve infiltration such as infiltration of the optic nerve as well as facial and acoustic nerves. One patient had cerebral cortex infiltration and another patient presented a medullary compression due to an epidural lesion with soft tissue infiltration which included the penis.

Conclusions: A wide spectrum of findings can be found in the CNS due to leukemia. Early diagnosis of the manifestations is essential because many are treatable. Improved imaging techniques aid in the characterization of CNS involvement in leukemia.

Testicular Yolk Sac Tumour: What the Radiologist Needs to Know

Mikel Elgezabal¹, María Berastegui², Iskander Arteche², Sara García²

1. University of the Basque Country. Cruces University Hospital. Department of Radiology.

2. SERAM (Sociedad Española de Radiología Médica) - Spanish Society of Medical Radiology

Purpose/Objective/Background: To sum up available evidence on prepuberal testicular yolk sac tumours and present it from a radiology viewpoint. To provide the reader with all necessary information in order to diagnose and manage testicular yolk sac tumours.

Methods: Review of relevant literature on testicular yolk sac tumours, adding illustrative examples and our own experience from cases collected from our Institution—a reference hospital for Paediatric Medicine and Surgery.

Materials: Bibliographic review. Own case archive.

Results: Testicular yolk sac tumours (TYST), also known as endodermal sinus tumours, are a type of germ cell tumour. Under the WHO 2016 classification, testicular TYST are divided in prepuberal and postpuberal types. Prepuberal TYST are considered the pure form (derived from normal spermatogonia) and appear in infants and toddlers, whereas postpuberal YST are secondary to abnormally developed embryonic cells and present in adults 18 to 45. Although rare overall, prepuberal TYST has paramount importance in paediatrics as it accounts for up to 80% of testicular neoplasms in children under 3 years of age. It usually presents as a painless testicular mass in an infant or a toddler. TYST can be differentiated from other causes of testicular swelling in young children thanks to its characteristic US appearance, and diagnosis is usually confirmed with molecular and histopathological markers. Staging and imaging follow up are primarily done with MR and/or PET-CT as well as alpha-fetoprotein levels. Treatment of TYST involves orchiectomy with optional adjuvant chemotherapy. Prognosis of YST in prepuberal children is generally good, although retroperitoneal lymphatic recurrence is not rare and should be watched out for.

Conclusions: Testicular YST is relatively uncommon, but it is the number one cause of testicular cancer in children from ages 0 to 3. The pediatric radiologist should be familiar with its clinical and imaging presentation as well as its basic management.

Chest wall lipoblastoma in a 4-year-old boy, a case report

Neda Azin¹, Mehdi Shahsavani²

1. Assistant Professor, Department of Radiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

2. Resident, Department of Radiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Lipoblastomas are uncommon benign encapsulated tumors of embryonic white fat that mostly found in infants and young children. The extremities and the torso are the most frequent sites for tumors. Chest wall lipoblastomas are very rare and only a few cases are reported.

Case report: We present a 4-year-old boy that was evaluated for suspicion of a foreign body. However, the lipoblastoma was discovered incidentally on a computed tomography (CT) imaging. The histopathological analysis in our instance was confirm the lipoblastoma diagnosis. Then, patient was operated, and the lesion was excised completely.

Conclusion: In children, a chest wall lipoblastoma should be considered as a differential diagnosis for any pediatric thoracic tumor, despite the fact that it is extremely uncommon.

Keywords: Lipoblastoma, chest wall, thoracic mass, children.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

PRELIMINARY PROGRAMME

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

POST GRADUATE COURSE

MONDAY, JUNE 5 - EXHIBITION HALL

09h00 09h30	OPENING CEREMONY. Polina Pavičević, Jovan Lovrenski
09h30 11h00	FETAL MRI FOR BEGGINERS Chairs: Martin Kyncł, Erika Rubesova Building a Fetal MRI program in practice. Teresa Victoria 09h30 Fetal MRI for the diagnosis of body anomalies. Erika Rubesova 09h57 Fetal MRI for the diagnosis of neurological anomalies. Martin Kyncł 10h24 Discussion 10h51
11h00	COFFEE BREAK
11h30 13h00	PAEDIATRIC URETHRAL PATHOLOGY Chairs: Frederika Papadopoulou, Polina Pavičević 11h30 Reconstructive surgery of urethra in children. Miroslav Dorđević 11h50 Diagnosis of congenital urethral anomalies by voiding cystourethrography. Polina Pavičević 12h10 CeVus of urethra. Frederica Papadopoulou 12h30 Discussion 13h00
13h00	LUNCH
14h00 15h30	ENDOCRINE DISEASES IN CHILDREN Chairs: Maria Raissaki, Lil-Sofie Ording Muller 14h00 Disorders of Puberty: An Approach to Diagnosis and Management. Vera Zdravković 14h20 Neuroimaging for the paediatric endocrinologist. Sandra Nedović 14h40 Imaging of the thyroid and parathyroid glands in children. Maria Raissaki 15h00 Female Pelvis: Precocious Puberty – Primary Amenorrhea. Lil-Sofie Ording Muller 15h20 Discussion 15h30
15h30	COFFEE BREAK
16h00 17h30	JUVENILE IDIOPATHIC ARTHRITIS Chairs: Damjana Ključevšek, Laura Tantarri de Horatio 16h00 The role of radiography in diagnosing, monitoring and predicting JIA. Damjana Ključevšek 16h20 The role of ultrasound in diagnosing, monitoring and predicting JIA. Iwona Sudol-Szopinska 16h40 The role of MRI in diagnosing, monitoring and predicting JIA. Laura Tantarri de Horatio 17h00 Clinical perspective on JIA imaging. Tadej Avčín 17h20 Discussion 17h30
17h30	END OF SESSION

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

POST GRADUATE COURSE

TUESDAY, JUNE 6 - EXHIBITION HALL

- 08h30 | 10h00** **PAEDIATRIC CARDIAC CT FOR BEGINNERS**
Chairs: Aurelio Secinaro, Pablo Caro-Dominguez
08h30 Technique, indications, hardware, ECG-gating and contrast. Joost van Schuppen
08h57 Exciting cases: congenital heart disease. Lucia Riaza-Martin
09h24 Exciting cases: coronary arteries and aortic anomalies. Maria Navallas
09h51 Discussion
- 10h00** **COFFEE BREAK**
- 10h30 | 12h00** **IMAGING OF DIAPHRAGMATIC PATHOLOGY**
Chairs: Teresa Victoria, Jovan Lovrenski
10h30 Ultrasound imaging of diaphragmatic motion: the technique. Lauren May
10h50 Ultrasound imaging of diaphragm: the cases. Jovan Lovrenski
11h05 The role of MRI in evaluation of functional diaphragmatic disorders. Pierluigi Ciet
11h25 Fetal and postnatal MRI in evaluation of diaphragmatic hernia. Teresa Victoria
11h50 Discussion
- 12h00 | 13h00** **INTERSTITIAL LUNG DISEASES**
Chair: Alistair Calder
12h00 Radiological - pathological correlation in children with childhood ILD:
a structured approach to the diagnosis. Pierluigi Ciet and Jan von der Thusen
12h50 Discussion
- 13h00** **LUNCH**
- 14h00 | 15h40** **NEONATAL NEURORADIOLOGY**
Chairs: Katarina Koprivšek, Savvas Andronikou
14h00 Brain CEUS - where are we now? Misun Hwang
14h20 MRI in cerebral sinovenous thrombosis - clear-cut or dilemma? Katarina Koprivšek
14h40 The brain's kryptonite:
a practical approach to punctate white matter lesions in neonates. Felice D'Arco
15h00 Delayed MR imaging of the brain in neonatal hypoxic ischaemic injury:
lessons from the developing world. Savvas Andronikou
15h20 Discussion
- 15h40 | 16h40** **INTEGRATIVE DIAGNOSTICS OF THE GASTRO-INTESTINAL TRACT.**
Erich Sorantin, Andrea Huber-Zeyringer
- 16h40** **COFFEE BREAK**
- 17h10 | 17h55** **JESPER LECTURE**
17h10 Hot topics in paediatric radiology in the next decade. Kassa Darge
17h55 **END OF SESSION**

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

WEDNESDAY, JUNE 7 - PACIFIC HALL

- 08h30 | 09h00** **OPENING CEREMONY.** Polina Pavičević, Jovan Lovrenski
- 09h00 | 10h30** **CARDIOTHORACIC TF: LUNG AND CARDIOVASCULAR INFECTIONS IN IMMUNOCOMPETENT AND IMMUNOCOMPROMISED CHILDREN**
Chairs: Pablo Caro-Dominguez, Jovan Lovrenski
- 09h00** Imaging of complicated pneumonia - from CR to MRI. Efthymia Alexopoulou
09h20 Complicated pneumonia from pulmonologist's point of view - raising a level of mutual understanding and cooperation. Silvia Carraro
- 09h40** Imaging of paediatric cardiac infections. Daniel Gräfe
10h00 Lung infections in immunocompromised children. Alistair Calder
10h20 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **CT AND DOSE TF: PATIENT SHIELDING AND CT PROTOCOLS MADE EASY - "Patient shielding is no longer needed"**
Chairs: Claudio Granata, Erich Sorantin
- 11h00** Pros. Claudio Granata
11h15 Cons. Erich Sorantin
11h30 Discussion
11h35 Radiologic imaging during pregnancy: dose exposure and related risks for the fetus. Joanna Kasznia-Brown
11h50 Discussion
11h55 CT Protocols made easy - an ultrafast guide. Erich Sorantin
12h25 Discussion
- 12h30** **LUNCH**
- 13h30 | 15h00** **ESPR MEETS IMAGE GENTLY ALLIANCE: Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care**
Chairs: Donald Frush, Claudio Granata
- 13h30** Introduction. Donald Frush
13h35 Diagnostic Reference Levels: European and North American approach. Claudio Granata, Donald Frush
14h00 Cumulative Radiation Dose. Donald Frush
14h25 Panel discussion with audience participation. Claudio Granata, Donald Frush, Erich Sorantin
- 15h00** **COFFEE BREAK**
- 15h30 | 17h00** **OUTREACH TF SESSION: Imaging of unusual infections in children - what's new?**
Chairs: Joanna Kasznia-Brown, Tatiana Fazecas
- 15h30** Pre - and postnatal evaluation of congenital infections. Tatiana Fazecas
15h47 Paediatric Pulmonary TB - Current perspectives and future directions. Kushaljit Singh Sodhi
16h04 COVID and atypical chest infections. Domen Plut
16h21 Challenges in imaging intracranial infections. Savvas Andronikou
16h38 Imaging findings of paediatric hydatid disease. Carlos Ugas
16h55 Discussion
- 17h30 | 19h00** **GENERAL ASSEMBLY**

WEDNESDAY, JUNE 7 - ATLANTIC HALL

- 09h00 | 10h30** **FETAL TF: NORMAL AND PATHOLOGICAL SPINAL CORD**
Chair: Marie Cassart, Catherine Garel
- 09h00** Normal sonographic patterns of the fetal spine and spinal cord. Catherine Garel and Eleonore Blondiaux
09h15 MRI of the fetal spinal cord. Andrea Rossi
09h50 Fetal spinal cord pathologies: pre - and postnatal correlations. Catherine Garel
10h20 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **NEURORADIOLOGY TF**
Chairs: Maria Argyropoulou, Catherine Adamsbaum
- 11h00** Standardised protocols for magnetic resonance imaging in paediatric head and neck pathologies: a consensus statement. Felice D'Arco
11h27 New and revised brain tumor types. Volodia Dangouloff-Ros
11h54 AI in paediatric neuro-oncology. Kish Mankad
12h21 Discussion

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



12h30	LUNCH
13h30 15h00	INTERVENTIONAL RADIOLOGY TF Chairs: Simon McGuirk , Stéphanie Franchi-Abella
13h30	Paediatric IR in oncology. Fernando Gomez
13h57	Image Guided Drain Insertion - Pleural Effusion, Abscesses and other indications. Ralph Gnannt
14h12	Paediatric Interventional Radiology at Kantha Bopha Hospital in Cambodia. Ung Sithaung
14h51	Discussion
15h00	COFFEE BREAK
15h30 17h10	SCIENTIFIC SESSION: NEURORADIOLOGY AND FETAL IMAGING Chairs: Marya Argyropoulou , Marrie Cassart
15h30	Plenary lecture - Paediatric MR encephalography. Tim Roberts
15h55	MRI and Neurosonogram correlation of paediatric brain with dystocia. Dhananjaya Kotebagilu Narayana Vamyanmane
16h01	An easy applicable brain myelin quantification method. Efstratios Karavasilis
16h07	Cerebral Blood Flow Patterns in Preterm and Term Neonates Assessed with Pseudo-Continuous Arterial Spin Labeling Perfusion MRI. Eleonora Piccirilli
16h13	Isolated hypogonadotropic hypogonadism in adolescence: Do we need to measure pituitary gland? A retrospective MRI study. Ercan Ayaz
16h19	Intraoperative MRI assessment of the tissue damage during laser ablation of hypothalamic hamartoma. Felice D'Arco
16h25	Do children with suspected inflicted skull fractures really need an MRI? Harriet Edwards
16h31	Frequency of Cerebellar-Thalamic Circuit Involvement in Term Hypoxic-Ischemic Injury and Relationship to MRI Pattern of Injury. Luis Octavio Tierradentro-Garcia
16h37	Image Quality Transfer can improve the contrast and lesion characterisation in low-field MRI. Matteo Figini
16h43	Is there a difference in subcortical volume in children with non-lesion and lesion epilepsy? Zorica Jokovic
16h49	Contributions of Adding a Routine Mastoid Fontanel Approach to Anterior Transfontanel Evaluation in the Newborn. Sevinc Tasar
16h55	Discussion
17h10	END OF SESSION

WEDNESDAY, JUNE 7 - MEDITERRANEAN/ADRIATIC HALL

10h00 12h30	Intravenous Contrast-enhanced Ultrasound (CEUS)
A. IV CEUS	
10h00 10h45	SESSION 1: Intravenous CEUS procedure
10h00	CHOP sonographer
	Contrast preparation. Alyx Escamilla & Elizabeth Brennan
10h05	Intravenous CEUS technique - phantom live demonstration. Alyx Escamilla & Dr. Susan J. Back
10h20	Safety of intravenous and intracavitary CEUS in children. Dr. Aikaterini Ntoulia
10h35	Questions - Break
10h45 11h25	SESSION 2: Intravenous CEUS applications
10h45	Hepatic CEUS: routine examinations. Dr. Rebecca Dennis
10h55	Hepatic CEUS: trouble shooting tool. Dr. Rebecca Dennis
11h05	Interventional radiology: Intra-vascular applications of CEUS. Dr. Abhay Srinivasan
11h15	Questions - Break
11h25 12h30	SESSION 3: Intravenous CEUS in advanced applications
11h25	Trouble shooting with intravenous CEUS outside of the liver. Dr. Susan J. Back & Dr. Aikaterini Ntoulia
11h45	Bowel CEUS: evaluation of inflammatory bowel disease. Dr. Damjana Ključevšek
11h55	Bowel CEUS in the intensive care unit. Dr. Misun Hwang
12h05	Brain CEUS. Dr. Misun Hwang
12h15	Questions - Break
12h25	Session A wrap up
12h30	LUNCH

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

B. INTRACAVITARY CEUS

- 13h30 | 13h45** **SESSION 1: Intravesical CEUS procedure**
13h30 Intracavitary CEUS technique - phantom live demonstration. Elizabeth Brennan & Dr. Susan J. Back
- 13h45 | 14h25** **SESSION 2: Contrast-enhanced voiding urosonography (ceVUS)**
13h45 CeVUS in vesicoureteral reflux. Dr. Kassa Darge
13h55 CeVUS in urethral assessment. Dr. Viviana Patricia Beltran Salazar
14h05 Advanced GU applications. Dr. Kassa Darge
14h15 Questions - Break
- 14h25 | 14h55** **SESSION 3: Interventional Radiology: intracavitary applications**
14h25 Procedural intra-cavitary applications of CEUS in IR. Dr. Abhay Srinivasan
14h35 Intralymphatic applications of CEUS. Fernando Escobar
14h45 Questions - Break
- 14h55 | 15h25** **SESSION 4: Future directions**
14h50 Pediatric CEUS highlights: what is the future direction of CEUS. Dr. Kassa Darge
15h05 Session B wrap up - Course closing
- 15h25** COFFEE BREAK
- 16h00 | 16h30** CEUS Hands-On Workshop
- 16h45 | 17h15** CEUS Hands-On Workshop
- 17h30 | 18h15** CEUS Hands-On Workshop
- 18h15 | 18h45** CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR 2023

57th ANNUAL MEETING & 43rd POST GRADUATE COURSE



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

THURSDAY, JUNE 8 - PACIFIC HALL

- 09h00 | 10h30** **WFPI SESSION**
 09h00 Ultrasound imaging in paediatric neonatal care unit. [Joanna Kasznia-Brown](#)
 09h17 Ultrasound imaging in vascular soft tissue lesions. [Andres Garcia Bayce](#)
 09h34 Transperineal evaluation of genitourinary pathologies. [Tatiana Fazecas](#)
 09h51 Tips and pitfalls in acute scrotal ultrasound. [Andres Garcia Bayce](#)
 10h08 Contrast ultrasound in abdominal trauma. [Kassa Darge](#)
 10h25 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h55** **ARTIFICIAL INTELLIGENCE TF**
 Chair: [Susan Shelmerdine](#)
 11h00 Intended and Unintended Consequence of AI for Paediatric Radiology. [Susan Shelmerdine](#)
 11h23 My journey with AI. [Jaishree Naidoo](#)
 11h46 AI conception to commercialization. [Jeevesh Kapur](#)
 12h10 AI workshop. [Jaishree Naidoo](#)
- 12h30** **LUNCH**
- 13h30 | 15h00** **RESEARCH SESSION: How to succeed**
 Chairs: [Amaka Offiah](#), [Owen Arthurs](#)
 13h00 How to start and design your project. [Savvas Andronikou](#)
 13h47 Looking for funding and grant application. [Susan Shelmerdine](#)
 14h04 Making research easy. [Owen Arthurs](#)
 14h21 How not to get into the trouble. [Hansel Otero](#)
 14h38 Getting your research published: an editor's point of view. [Amaka Offiah](#)
 14h55 Discussion
- 15h10** **COFFEE BREAK**
- 15h30 | 17h00** **ONCOLOGY TF**
 Chair: [Rutger A.J. Nievelstein](#)
 15h30 Introduction. [Rutger A.J. Nievelstein](#)
 15h35 Hybrid Imaging in paediatric oncology. [Jürgen Schaefer](#)
 16h00 Imaging Biomarkers/Radiomics in paediatric oncology: first results from the PRIMAGE project.
[Diana Veiga Canuto](#)
 16h25 New therapeutics in paediatric solid tumors; what the paediatric radiologist should know!
[Miranda Dierselhuis](#)
 16h50 Discussion
- 17h00** **END OF SESSION**

BELGRADE, SERBIA / [Crowne Plaza Hotel](#)

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



THURSDAY, JUNE 8 - ATLANTIC HALL

- 09h00 | 10h30** **SCIENTIFIC SESSION: Cardiothoracic**
Chairs: Pablo Caro Dominguez, Franz Wolfgang Hirsch
- 09h00 Plenary lecture: What is real-time MRI and what is it used for in paediatric radiology?
[Franz Wolfgang Hirsch](#)
- 09h25 Late chest wall sequelae after neonatal corrective surgery for esophageal atresia: a real-time MRI study. [Daniel Grafe](#)
- 09h31 The usefulness of lung ultrasound in newborns and infants with respiratory pathologies.
[Emil Robert Stoicesku](#)
- 09h37 Dual Phase CTA evaluation of the Pulmonary Veins with Dual Energy and High-pitch ECG-Gated CTA. [Jordan Rapp](#)
- 09h43 Phase resolved functional lung (PREFUL) MRI detects improvement of perfusion and ventilation after Elexacaftor/Tezacaftor/Ivacaftor therapy in patients with Cystic Fibrosis.
[Martha Dohna](#)
- 09h49 UTE/ZTE lung-MRI in the diagnosis of tracheobronchial stenosis in children.
[Nadja Kocher](#)
- 09h55 CT-Based Predictive Model for Myocardial Ischemia in Anomalous Aortic Origin of Coronary Artery. [Rajesh Krishnamurthy](#)
- 10h01 Conservative vs. surgical treatment of parapneumonic effusions in children - where are the ultrasonographic boundaries? [Svetlana Balj Barbir](#)
- 10h07 Congenital Variants and Anomalies of the Aortic Arch - single centre study. [Vesna Topić](#)
- 10h13 Dynamic Contrast Magnetic Resonance Lymphangiography (DCMRL) in Neonates and Children: categorizing imaging findings to predict outcome and to guide therapy. [Ralph Gnannt](#)
- 10h19 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **ORAL PRESENTATIONS OF CHOSEN YOUNG PAEDIATRIC RADIOLOGISTS (3)**
- 11h00 Radiomics and chemotherapy response in paediatric patients with Ewing-Sarcoma. [Julia Miedler](#)
- 11h20 MRI-DWI in paediatric renal tumors - *Correlation with histopathology*. [Justine N. Van der Beek](#)
- 11h40 Mucopolysaccharidosis - Demographics and Imaging Findings. [Ercan Ayaz](#)
- 12h00** Jacques Lefebvre lecture -Penile reconstructive surgery in children and adolescents.
[Miroslav Đorđević](#)
- 12h30** **LUNCH**
- 13h30 | 15h00** **SCIENTIFIC SESSION: Oncology and Interventional Radiology**
Chairs: Rutger A.J. Nievelstein, Ralph Gnannt
- 13h30 Plenary lecture: Staging and response assessment in paediatric lymphoma: an update!
[Rutger A.J. Nievelstein](#)
- 13h55 Imaging of paediatric mandibular tumors. [Birgit Spors](#)
- 14h01 Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age. [Gozde Ozer](#)
- 14h07 Super-selective embolisation for traumatic non-ischaemic priapism; a case series.
[Jonathan Bevan](#)
- 14h19 Diffuse midline glioma different locations and tips differential diagnosis. [Marta Gomez Chiari](#)
- 14h25 Retrospective series of renal biopsies in paediatric patients from 2016 to 2022: analysis of complications and outcomes using a standardized protocol. [Marta Gonzales Carballes](#)
- 14h31 Feasibility and diagnostic accuracy of early postoperative MRI after resection of neuroblastic tumors. [Maryanna Chaika](#)
- 14h37 Two-year experience of Treatment of Osteoid Osteomas and Osteoblastomas in a Paediatric tertiary hospital. [Rituparna Saha](#)
- 14h43 Preoperative Multimodal Assessment of Functional and Metabolic Tumor Volume in Paediatric Rhabdomyosarcoma. [Simon Männlin](#)
- 14h49 Virtual reality glasses: distraction technique to reduce sedation rates in children undergoing interventional radiology procedures. [Elisa Aguirre Pascual](#)
- 15h01 Discussion
- 15h10** **COFFEE BREAK**
- 15h30 | 17h00** **SCIENTIFIC SESSION: Child abuse and Post mortem**
Chairs: Rick R. Van Rijn, Owen Arthurs
- 15h30 Plenary lecture: Child abuse - a post-mortem forensic perspective. [Rick R. Van Rijn](#)
- 15h55 Rib fracture diagnosis in suspected abuse: computed tomography or radiographs (RECEPTOR): a multicentre diagnostic accuracy observational study. [Nasser Alzahrani](#)
- 16h01 International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse. [Jai Sidpra](#)
- 16h07 Combined Prenatal US and Post-mortem fetal MRI: can they replace conventional autopsy for fetal body abnormalities? [Marine Moeremans](#)
- 16h13 Submission Preview: Structuring International Paediatric Radiology coverage at a major United States Academic Children's Hospital. [Benjamin Taragin](#)

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



16h19	CT carbon calculator. Michael Jackson
16h25	Prevalence of metaphyseal fractures in infants with and without evidence of abusive head injury: Does shaking cause metaphyseal fractures? Um-Kalsum Rashed
16h31	When Greens Are Not So Good for You. Soft Tissue Foreign Bodies: a Radiology and Plastic Surgery Perspective. Fiona Katherine McCurdie
16h37	Imaging findings of head and neck juvenile xanthogranuloma, in 10 patients. Francois Chalard
16h43	Imaging findings of pulmonary and extrapulmonary sarcoidosis in children. Gozde Ozer
16h49	Significant increase in complicating upper respiratory tract infections in children during the 2022/2023 winter season - a post COVID effect? Corona Metz
16h55	Clinico-radiological rounds with ultrasonography in neonatal intensive care unit. Dhananjaya Kotebagilu Narayana Vamyanmane
17h01	Discussion
17h30 18h30	JESPER SESSION - Daily routine challenges for young paediatric radiologists Chair: Julian Jürgens
17h30	Challenges for young paediatric radiologists. Julian Jürgens
17h41	Challenge 1: The difficult child. Catherine Owens (TBC)
17h52	Challenge 2: Talk to parents. Alexia Dabadie
18h03	Challenge 3: Talk about mistakes. Erich Sorantin
18h14	Challenge 4: How to compete with hard cases. Rutger Jan Nievelstein
18h25	Discussion
18h30	END OF SESSION

THURSDAY, JUNE 8 - MEDITERRANEAN/ADRIATIC HALL

09h00 09h30	CEUS Hands-On Workshop
10h00 10h30	CEUS Hands-On Workshop
11h00 11h30	CEUS Hands-On Workshop
12h00 12h30	CEUS Hands-On Workshop
14h00 14h30	CEUS Hands-On Workshop
15h30 16h00	CEUS Hands-On Workshop
16h15 16h45	CEUS Hands-On Workshop
17h00 17h30	CEUS Hands-On Workshop

BELGRADE, SERBIA / [Crowne Plaza Hotel](#)

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

FRIDAY, JUNE 9 - PACIFIC HALL

- 09h00 | 10h40** **CHILED ABUSE TF: KEEPING AN OPEN MIND**
Chairs: Amaka C Offiah
Introduction. Amaka C Offiah
09h00
09h02 TEN-4-FACEsp: A mnemonic not to forget. Michelle Nagtegaal
09h20 Alternative diagnoses: what else besides abusive fractures? Annmarie Jeanes
09h38 Alternative diagnoses: What else besides AHT? Kshitij Mankad
09h56 Bayes in child abuse. Michelle Nagtegaal
10h14 East meets West: Differences between Eastern and Western Europe?
Panel discussion. Amaka C Offiah, Maria Raissaki, Damjana Ključevšek, Irmina Sefić, Goran Ročić, Jovan Lovrenski
10h27 Closing Remarks. Amaka C Offiah
- 10h40** **COFFEE BREAK**
- 11h00 | 12h30** **VOIDING DYSFUNCTIONS**
Chairs: Damjana Ključevšek, Erich Sorantin
11h00 Classification, pathogenesis and clinical approach to voiding dysfunctions, urinary incontinence and enuresis in children. Andrea Ročić
11h27 The role of ultrasonography techniques in children with voiding disfunction. Damjana Ključevšek
11h54 Non-ultrasound imaging methods in voiding dysfunctions. Erich Sorantin
12h21 Discussion
- 12h30** **LUNCH**
- 13h30 | 15h00** **MEDICO-LEGAL CHALLENGES IN PAEDIATRIC RADIOLOGY - WHAT DO I NEED TO KNOW**
Chairs: Joanna Kasznia-Brown, Rick R. Van Rijn
13h30 Most common diagnostic errors in paediatric radiology. Rick R. van Rijn
13h50 Medico-legal aspects of radiological reports in suspected child abuse. Amaka Offiah
14h10 When you are called to the court. Owen Arthurs
14h30 Perspective from the judge. Wilma Duijst
14h50 Discussion
- 15h00** **COFFEE BREAK**
- 15h30 | 17h00** **ABDOMINAL TF**
Chairs: Lil-Sofie Ording Muller, Philippe Petit
15h00 Imaging in steatosis, current practice and knowledge. Seema Toso
15h55 Discussion
16h00 Basic elastography and its clinical applications. Jochen Herrmann, Martijn Verhagen
16h25 Discussion
16h30 Around the world of intussusception. Giulia Perucca
16h55 Discussion
- 17h00** **CLOSING CEREMONY**

FRIDAY, JUNE 9 - ATLANTIC HALL

- 09h00 | 10h40** **SCIENTIFIC SESSION: GI and GU**
Chairs: Giulia Perucca, Seema Toso
09h00 Plenary lecture: Paediatric MR lymphangiography. Jordan Rapp
09h25 Shear wave elastography and shear wave dispersion correlated to biopsy in scheduled follow-up of paediatric liver grafts. Ivan Cetinic
09h31 Liver MR and US elastography correlation to 4D flow and lymphatic stasis in paediatric Fontan Circulation. Charlotte de Lange
09h37 Liver shear wave elastography and portal venous doppler estimation before and after meal in paediatric patients with diffuse liver disease. Tijana Radović
09h43 Quantified Motility MR Enterography Response Assessment in Paediatric Inflammatory Bowel Disease. Riwa Meshaka
09h49 Hepato-renal index on ultrasound in overweight children as non-invasive quantitative imaging Biomarker. Virginie Frings
09h55 Ultrasound shear-wave elastography and attenuation imaging compared to histology in paediatric patients. Michael Zellner
10h01 Is ASL MRI the new tool for reliable renal perfusion quantification? Study of quality and reliability of repeated measurements. Tijana Radović
10h07 Ovarian Torsion: Challenges in Sonographic-Surgical discordance. Anna Seehofnerova
10h13 Antibiotic Prophylaxis for Micturating Cystourethrography: Findings from a National Multidisciplinary Survey. Harsimran Laidlow-Singh
10h19 Comparison of superb microvascular imaging with Color and Power Doppler imaging in the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



10h25	evaluation of testicular vascularity with Doppler Ultrasound for determination of viability in undescended testes in children. Mustafa Faraşat
10h31	An optimised diagnostic imaging pathway for suspected renovascular hypertension in children. Rita Pina Prata
10h40	Discussion
10h40	COFFEE BREAK
11h00 12h30	MUSCULOSKELETAL TF
11h00	Chairs: Karen Rosendahl , Laura Tanturri de Horatio
11h05	Introduction. Karen Rosendahl
11h25	Ultrasound of the joints in children; MSK TF recommendations on techniques and Measurements. Céline Habre
11h45	Novel standards for knee ultrasound. Silvia Costa Dias
12h15	MRI and advanced imaging of the growth plate in the adolescent and young adult. Ola Krvist
12h30	Discussion
12h30	LUNCH
13h30 15h00	SCIENTIFIC SESSION: MSK and AI
13h30	Chairs: Karen Rosendahl , Susan Shelmerdine
13h55	Plenary lecture: Imaging Musculoskeletal Manifestations of Paediatric Hematologic Malignancies. Karen Rosendahl
14h01	Role of T2-weighted MR radiomics in the prediction of FOXO1 fusion-positive rhabdomyosarcoma. Adarsh Ghosh
14h07	Paediatric bone age estimation from lateral elbow radiographs using a machine learning-mediated approach. Alcide Alessandro Azzena
14h13	Fully automated measurement of Cobb angle in coronal plane spine radiographs. Christoph Salzlechner
14h19	Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort. Daniel Grafe
14h25	An initial approach of Artificial intelligence in paediatric brain segmentation and quantification using Magnetic Resonance Imaging. Dhananjaya Kotebagilu Narayana Vamyanmane
14h31	Preferential involvement of the pelvis and hips along with active sacroiliitis in chronic nonbacterial osteomyelitis. Ercan Ayaz
14h37	Diagnostic performance of an artificial intelligence aid for the detection of paediatric appendicular skeletal fractures. Irmhild Altmann-Schneider
14h43	ZTE sequences with AI-based image reconstruction for 3D evaluation of the temporomandibular joint and craniofacial bones in children with juvenile idiopathic arthritis. Nadja Kocher
14h49	Artificial intelligence-based image reconstruction of abdominal MRI in children. Vanda Pocepcova
14h55	Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DW-MRI) in tumoral and Non-tumoral paediatric Bone Marrow Diseases (BMD). Tatiana Fazecas
15h00	Discussion
15h00	COFFEE BREAK
15h30 17h00	POSTMORTEM TF
15h30	Chair: Owen Arthurs
15h35	Introduction. Owen Arthurs
16h00	Postmortem imaging - how to get started. Aurelie Dhondt
16h25	Postmortem CT - how to report. Rick R. van Rijn
16h50	How do I pay for postmortem imaging? Owen Arthurs
17h00	Discussion
17h00	END OF SESSION

FRIDAY, JUNE 9 - MEDITERRANEAN/ADRIATIC HALL

09h00 09h30	CEUS Hands-On Workshop
10h00 10h30	CEUS Hands-On Workshop
11h00 11h30	CEUS Hands-On Workshop
14h00 14h30	CEUS Hands-On Workshop
15h30 16h00	CEUS Hands-On Workshop
16h15 16h45	CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

PROGRAMME

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



43rd Postgraduate Course

Day 1 – Monday, 5th June 2023

09h30 | 11h00 Fetal MRI for beginners
11h30 | 13h00 Paediatric urethral pathology
14h00 | 15h30 Endocrine diseases in children
16h00 | 17h30 Juvenile idiopathic arthritis

Day 2 – Tuesday, 6th June 2023

08h30 | 10h00 Paediatric cardiac CT for beginners
10h30 | 12h00 Imaging of diaphragmatic pathology
12h00 | 13h00 Interstitial lung diseases
14h00 | 15h40 Neonatal neuroradiology
15h40 | 16h40 Integrative diagnostics of the gastro-intestinal tract
17h10 | 17h55 Jesper lecture (Hot topics in paediatric radiology in the next decade)

57th Annual Meeting

Day 3 – Wednesday, 7th June 2023

09h00 | 10h30
Cardiothoracic Taskforce: Lung and cardiovascular Infections in immunocompetent and immunocompromised children
11h00 | 12h30
CT and dose Taskforce:
Patient shielding & CT protocols made easy
13h30 | 15h00
ESPR meets Image Gently Alliance:
Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care
15h30 | 17h00
Outreach Taskforce:
Imaging of unusual infections in children – what's new?

09h00 | 10h30
Fetal Imaging Taskforce
Normal and pathological spinal cord
11h00 | 12h30
Neuroradiology Taskforce
13h30 | 15h00
Interventional radiology Taskforce
15h30 | 17h10
Scientific session:
Neuroradiology and Fetal Imaging

10h00 | 12h30
CHOP workshop: Intravenous Contrast-enhanced ultrasound (CEUS)

13h30 | 15h25
Intracavitary CEUS
16h00 | 16h30 CEUS Hands-On Workshop

16h45 | 17h15 CEUS Hands-On Workshop
17h30 | 18h45 Two CEUS Hands-On Workshops

Day 4 – Thursday, 8th June 2023

09h00 | 10h30
WFPI session
11h00 | 12h55
Artificial Intelligence Taskforce
13h30 | 15h00
Research session: How to succeed
15h30 | 17h00
Oncology Taskforce

09h00 | 10h30
Scientific session:
Cardiothoracic
11h00 | 12h30
Oral presentations of chosen young paediatric radiologists
13h30 | 15h00
Scientific session: Oncology and Interventional Radiology
15h30 | 17h00
Scientific session:
Child abuse and Post mortem
17h30 | 18h30
Jesper session: Daily routine challenges for young paediatric radiologists

09h00 | 09h30 CEUS Hands-On Workshop
10h00 | 10h30 CEUS Hands-On Workshop
11h00 | 11h30 CEUS Hands-On Workshop
12h00 | 12h30 CEUS Hands-On Workshop
14h00 | 14h30 CEUS Hands-On Workshop
15h30 | 16h00 CEUS Hands-On Workshop
16h15 | 16h45 CEUS Hands-On Workshop
17h00 | 17h30 CEUS Hands-On Workshop

Day 5 – Friday, 9th June 2023

09h00 | 10h40
Child abuse Taskforce: Keeping an open mind
11h00 | 12h30
Voiding disfunctions
13h30 | 15h00
Medico-legal challenges in paediatric radiology – what do I need to know
15h30 | 17h00
Abdominal Taskforce

09h00 | 10h40
Scientific session: GI and GU
11h00 | 12h30
Musculoskeletal Taskforce
13h30 | 15h00
Scientific session: MSK and AI
15h30 | 17h00
Post modern Taskforce

09h00 | 09h30 CEUS Hands-On Workshop
10h00 | 10h30 CEUS Hands-On Workshop
11h00 | 11h30 CEUS Hands-On Workshop
14h00 | 14h30 CEUS Hands-On Workshop
15h30 | 16h00 CEUS Hands-On Workshop
16h15 | 16h45 CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



POST GRADUATE COURSE

MONDAY, JUNE 5 - EXHIBITION HALL

09h00 09h30	OPENING CEREMONY. Polina Pavičević, Jovan Lovrenski
09h30 11h00	FETAL MRI FOR BEGGINERS Chairs: Martin Kyncł, Erika Rubesova Building a Fetal MRI program in practice. Teresa Victoria 09h30 Fetal MRI for the diagnosis of body anomalies. Erika Rubesova 09h57 Fetal MRI for the diagnosis of neurological anomalies. Martin Kyncł 10h24 Discussion 10h51
11h00	COFFEE BREAK
11h30 13h00	PAEDIATRIC URETHRAL PATHOLOGY Chairs: Frederika Papadopoulou, Polina Pavičević 11h30 Reconstructive surgery of urethra in children. Miroslav Dorđević 11h50 Diagnosis of congenital urethral anomalies by voiding cystourethrography. Polina Pavičević 12h10 CeVus of urethra. Frederica Papadopoulou 12h30 Discussion 13h00
13h00	LUNCH
14h00 15h30	ENDOCRINE DISEASES IN CHILDREN Chairs: Maria Raissaki, Lil-Sofie Ording Muller 14h00 Disorders of Puberty: An Approach to Diagnosis and Management. Vera Zdravković 14h20 Neuroimaging for the paediatric endocrinologist. Sandra Nedović 14h40 Imaging of the thyroid and parathyroid glands in children. Maria Raissaki 15h00 Female Pelvis: Precocious Puberty – Primary Amenorrhea. Lil-Sofie Ording Muller 15h20 Discussion 15h30
15h30	COFFEE BREAK
16h00 17h30	JUVENILE IDIOPATHIC ARTHRITIS Chairs: Damjana Ključevšek, Laura Tantarri de Horatio 16h00 The role of radiography in diagnosing, monitoring and predicting JIA. Damjana Ključevšek 16h20 The role of ultrasound in diagnosing, monitoring and predicting JIA. Iwona Sudol-Szopinska 16h40 The role of MRI in diagnosing, monitoring and predicting JIA. Laura Tantarri de Horatio 17h00 Clinical perspective on JIA imaging. Tadej Avčín 17h20 Discussion 17h30
17h30	END OF SESSION

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



POST GRADUATE COURSE

TUESDAY, JUNE 6 - EXHIBITION HALL

- 08h30 | 10h00** **PAEDIATRIC CARDIAC CT FOR BEGINNERS**
Chairs: Aurelio Secinaro, Pablo Caro-Dominguez
 08h30 Technique, indications, hardware, ECG-gating and contrast. Joost van Schuppen
 08h57 Exciting cases: congenital heart disease. Lucia Riaza-Martin
 09h24 Exciting cases: coronary arteries and aortic anomalies. Maria Navallas
 09h51 Discussion
- 10h00** **COFFEE BREAK**
- 10h30 | 12h00** **IMAGING OF DIAPHRAGMATIC PATHOLOGY**
Chairs: Teresa Victoria, Jovan Lovrenski
 10h30 Ultrasound imaging of diaphragmatic motion: the technique. Lauren May
 10h50 Ultrasound imaging of diaphragm: the cases. Jovan Lovrenski
 11h05 The role of MRI in evaluation of functional diaphragmatic disorders. Pierluigi Ciet
 11h25 Fetal and postnatal MRI in evaluation of diaphragmatic hernia. Teresa Victoria
 11h50 Discussion
- 12h00 | 13h00** **INTERSTITIAL LUNG DISEASES**
Chair: Alistair Calder
 12h00 Radiological - pathological correlation in children with childhood ILD:
 a structured approach to the diagnosis. Pierluigi Ciet and Jan von der Thusen
 12h50 Discussion
- 13h00** **LUNCH**
- 14h00 | 15h40** **NEONATAL NEURORADIOLOGY**
Chairs: Katarina Koprivšek, Savvas Andronikou
 14h00 Brain CEUS - where are we now? Misun Hwang
 14h20 MRI in cerebral sinovenous thrombosis - clear-cut or dilemma? Katarina Koprivšek
 14h40 The brain's kryptonite:
 a practical approach to punctate white matter lesions in neonates. Felice D'Arco
 15h00 Delayed MR imaging of the brain in neonatal hypoxic ischaemic injury:
 lessons from the developing world. Savvas Andronikou
 15h20 Discussion
- 15h40 | 16h40** **INTEGRATIVE DIAGNOSTICS OF THE GASTRO-INTESTINAL TRACT.**
Erich Sorantin, Andrea Huber-Zeyringer
- 16h40** **COFFEE BREAK**
- 17h10 | 17h55** **JESPER LECTURE**
 17h10 Hot topics in paediatric radiology in the next decade. Kassa Darge
 17h55 **END OF SESSION**

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

WEDNESDAY, JUNE 7 - PACIFIC HALL

- 08h30 | 09h00** OPENING CEREMONY. Polina Pavičević, Jovan Lovrenski
- 09h00 | 10h30** **CARDIOTHORACIC TF: LUNG AND CARDIOVASCULAR INFECTIONS IN IMMUNOCOMPETENT AND IMMUNOCOMPROMISED CHILDREN**
Chairs: Pablo Caro-Dominguez, Jovan Lovrenski
- 09h00** Imaging of complicated pneumonia - from CR to MRI. Efthymia Alexopoulou
09h20 Complicated pneumonia from pulmonologist's point of view - raising a level of mutual understanding and cooperation. Silvia Carraro
- 09h40** Imaging of paediatric cardiac infections. Daniel Gräfe
10h00 Lung infections in immunocompromised children. Alistair Calder
10h20 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **CT AND DOSE TF: PATIENT SHIELDING AND CT PROTOCOLS MADE EASY - "Patient shielding is no longer needed"**
Chairs: Claudio Granata, Erich Sorantin
- 11h00** Pros. Claudio Granata
11h15 Cons. Erich Sorantin
11h30 Discussion
11h35 Radiologic imaging during pregnancy: dose exposure and related risks for the fetus. Joanna Kasznia-Brown
11h50 Discussion
11h55 CT Protocols made easy - an ultrafast guide. Erich Sorantin
12h25 Discussion
- 12h30** **LUNCH**
- 13h30 | 15h00** **ESPR MEETS IMAGE GENTLY ALLIANCE: Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care**
Chairs: Donald Frush, Claudio Granata
- 13h30** Introduction. Donald Frush
13h35 Diagnostic Reference Levels: European and North American approach. Claudio Granata, Donald Frush
14h00 Cumulative Radiation Dose. Donald Frush
14h25 Panel discussion with audience participation. Claudio Granata, Donald Frush, Erich Sorantin
- 15h00** **COFFEE BREAK**
- 15h30 | 17h00** **OUTREACH TF SESSION: Imaging of unusual infections in children - what's new?**
Chairs: Joanna Kasznia-Brown, Tatiana Fazecas
- 15h30** Pre - and postnatal evaluation of congenital infections. Tatiana Fazecas
15h47 Paediatric Pulmonary TB - Current perspectives and future directions. Kushaljit Singh Sodhi
16h04 COVID and atypical chest infections. Domen Plut
16h21 Challenges in imaging intracranial infections. Savvas Andronikou
16h38 Imaging findings of paediatric hydatid disease. Carlos Ugas
16h55 Discussion
- 17h30 | 19h00** **GENERAL ASSEMBLY**

WEDNESDAY, JUNE 7 - ATLANTIC HALL

- 09h00 | 10h30** **FETAL TF: NORMAL AND PATHOLOGICAL SPINAL CORD**
Chair: Marie Cassart, Catherine Garel
- 09h00** Normal sonographic patterns of the fetal spine and spinal cord. Catherine Garel and Eleonore Blondiaux
09h15 MRI of the fetal spinal cord. Andrea Rossi
09h50 Fetal spinal cord pathologies: pre - and postnatal correlations. Catherine Garel
10h20 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **NEURORADIOLOGY TF**
Chairs: Maria Argyropoulou, Catherine Adamsbaum
- 11h00** Standardised protocols for magnetic resonance imaging in paediatric head and neck pathologies: a consensus statement. Felice D'Arco
11h27 New and revised brain tumor types. Volodia Dangouloff-Ros
11h54 AI in paediatric neuro-oncology. Kish Mankad
12h21 Discussion

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



12h30	LUNCH
13h30 15h00	INTERVENTIONAL RADIOLOGY TF Chairs: Simon McGuirk , Stéphanie Franchi-Abella
13h30	Paediatric IR in oncology. Fernando Gomez
13h57	Image Guided Drain Insertion - Pleural Effusion, Abscesses and other indications. Ralph Gnannt
14h12	Paediatric Interventional Radiology at Kantha Bopha Hospital in Cambodia. Ung Sithaung
14h51	Discussion
15h00	COFFEE BREAK
15h30 17h10	SCIENTIFIC SESSION: NEURORADIOLOGY AND FETAL IMAGING Chairs: Marya Argyropoulou , Marrie Cassart
15h30	Plenary lecture - Paediatric MR encephalography. Tim Roberts
15h55	MRI and Neurosonogram correlation of paediatric brain with dystocia. Dhananjaya Kotebagilu Narayana Vamyanmane
16h01	An easy applicable brain myelin quantification method. Efstratios Karavasilis
16h07	Cerebral Blood Flow Patterns in Preterm and Term Neonates Assessed with Pseudo-Continuous Arterial Spin Labeling Perfusion MRI. Eleonora Piccirilli
16h13	Isolated hypogonadotropic hypogonadism in adolescence: Do we need to measure pituitary gland? A retrospective MRI study. Ercan Ayaz
16h19	Intraoperative MRI assessment of the tissue damage during laser ablation of hypothalamic hamartoma. Felice D'Arco
16h25	Do children with suspected inflicted skull fractures really need an MRI? Harriet Edwards
16h31	Frequency of Cerebellar-Thalamic Circuit Involvement in Term Hypoxic-Ischemic Injury and Relationship to MRI Pattern of Injury. Luis Octavio Tierradentro-Garcia
16h37	Image Quality Transfer can improve the contrast and lesion characterisation in low-field MRI. Matteo Figini
16h43	Is there a difference in subcortical volume in children with non-lesion and lesion epilepsy? Zorica Jokovic
16h49	Contributions of Adding a Routine Mastoid Fontanel Approach to Anterior Transfontanel Evaluation in the Newborn. Sevinc Tasar
16h55	Discussion
17h10	END OF SESSION

WEDNESDAY, JUNE 7 - MEDITERRANEAN/ADRIATIC HALL

10h00 12h30	Intravenous Contrast-enhanced Ultrasound (CEUS)
A. IV CEUS	
10h00 10h45	SESSION 1: Intravenous CEUS procedure
10h00	CHOP sonographer
	Contrast preparation. Alyx Escamilla & Elizabeth Brennan
10h05	Intravenous CEUS technique - phantom live demonstration. Alyx Escamilla & Dr. Susan J. Back
10h20	Safety of intravenous and intracavitary CEUS in children. Dr. Aikaterini Ntoulia
10h35	Questions - Break
10h45 11h25	SESSION 2: Intravenous CEUS applications
10h45	Hepatic CEUS: routine examinations. Dr. Rebecca Dennis
10h55	Hepatic CEUS: trouble shooting tool. Dr. Rebecca Dennis
11h05	Interventional radiology: Intra-vascular applications of CEUS. Dr. Abhay Srinivasan
11h15	Questions - Break
11h25 12h30	SESSION 3: Intravenous CEUS in advanced applications
11h25	Trouble shooting with intravenous CEUS outside of the liver. Dr. Susan J. Back & Dr. Aikaterini Ntoulia
11h45	Bowel CEUS: evaluation of inflammatory bowel disease. Dr. Damjana Ključevšek
11h55	Bowel CEUS in the intensive care unit. Dr. Misun Hwang
12h05	Brain CEUS. Dr. Misun Hwang
12h15	Questions - Break
12h25	Session A wrap up
12h30	LUNCH

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

B. INTRACAVITARY CEUS

- 13h30 | 13h45** **SESSION 1: Intravesical CEUS procedure**
13h30 Intracavitary CEUS technique - phantom live demonstration. Elizabeth Brennan & Dr. Susan J. Back
- 13h45 | 14h25** **SESSION 2: Contrast-enhanced voiding urosonography (ceVUS)**
13h45 CeVUS in vesicoureteral reflux. Dr. Kassa Darge
13h55 CeVUS in urethral assessment. Dr. Viviana Patricia Beltran Salazar
14h05 Advanced GU applications. Dr. Kassa Darge
14h15 Questions - Break
- 14h25 | 14h55** **SESSION 3: Interventional Radiology: intracavitary applications**
14h25 Procedural intra-cavitary applications of CEUS in IR. Dr. Abhay Srinivasan
14h35 Intralymphatic applications of CEUS. Fernando Escobar
14h45 Questions - Break
- 14h55 | 15h25** **SESSION 4: Future directions**
14h55 Pediatric CEUS highlights: what is the future direction of CEUS. Dr. Kassa Darge
15h10 Session B wrap up - Course closing
- 15h25** COFFEE BREAK
- 16h00 | 16h30** CEUS Hands-On Workshop
- 16h45 | 17h15** CEUS Hands-On Workshop
- 17h30 | 18h15** CEUS Hands-On Workshop
- 18h15 | 18h45** CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

THURSDAY, JUNE 8 - PACIFIC HALL

- 09h00 | 10h30** **WFPI SESSION**
 09h00 Ultrasound imaging in paediatric neonatal care unit. [Joanna Kasznia-Brown](#)
 09h17 Ultrasound imaging in vascular soft tissue lesions. [Andres Garcia Bayce](#)
 09h34 Transperineal evaluation of genitourinary pathologies. [Tatiana Fazecas](#)
 09h51 Tips and pitfalls in acute scrotal ultrasound. [Andres Garcia Bayce](#)
 10h08 Contrast ultrasound in abdominal trauma. [Kassa Darge](#)
 10h25 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h55** **ARTIFICIAL INTELLIGENCE TF**
 Chair: [Susan Shelmerdine](#)
 11h00 Intended and Unintended Consequence of AI for Paediatric Radiology. [Susan Shelmerdine](#)
 11h23 My journey with AI. [Jaishree Naidoo](#)
 11h46 AI conception to commercialization. [Jeevesh Kapur](#)
 12h10 AI workshop. [Jaishree Naidoo](#)
- 12h30** **LUNCH**
- 13h30 | 15h00** **RESEARCH SESSION: How to succeed**
 Chairs: [Amaka Offiah](#), [Owen Arthurs](#)
 13h00 How to start and design your project. [Savvas Andronikou](#)
 13h47 Looking for funding and grant application. [Susan Shelmerdine](#)
 14h04 Making research easy. [Owen Arthurs](#)
 14h21 How not to get into the trouble. [Hansel Otero](#)
 14h38 Getting your research published: an editor's point of view. [Amaka Offiah](#)
 14h55 Discussion
- 15h10** **COFFEE BREAK**
- 15h30 | 17h00** **ONCOLOGY TF**
 Chair: [Rutger A.J. Nievelstein](#)
 15h30 Introduction. [Rutger A.J. Nievelstein](#)
 15h35 Hybrid Imaging in paediatric oncology. [Jürgen Schaefer](#)
 16h00 Imaging Biomarkers/Radiomics in paediatric oncology: first results from the PRIMAGE project.
[Diana Veiga Canuto](#)
 16h25 New therapeutics in paediatric solid tumors; what the paediatric radiologist should know!
[Miranda Dierselhuis](#)
 16h50 Discussion
- 17h00** **END OF SESSION**

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



THURSDAY, JUNE 8 - ATLANTIC HALL

- 09h00 | 10h30** **SCIENTIFIC SESSION: Cardiothoracic**
Chairs: Pablo Caro Dominguez, Franz Wolfgang Hirsch
- 09h00 Plenary lecture: What is real-time MRI and what is it used for in paediatric radiology?
[Franz Wolfgang Hirsch](#)
- 09h25 Late chest wall sequelae after neonatal corrective surgery for esophageal atresia: a real-time MRI study. [Daniel Grafe](#)
- 09h31 The usefulness of lung ultrasound in newborns and infants with respiratory pathologies.
[Emil Robert Stoicesku](#)
- 09h37 Dual Phase CTA evaluation of the Pulmonary Veins with Dual Energy and High-pitch ECG-Gated CTA. [Jordan Rapp](#)
- 09h43 Phase resolved functional lung (PREFUL) MRI detects improvement of perfusion and ventilation after Elexacaftor/Tezacaftor/Ivacaftor therapy in patients with Cystic Fibrosis.
[Martha Dohna](#)
- 09h49 UTE/ZTE lung-MRI in the diagnosis of tracheobronchial stenosis in children.
[Nadja Kocher](#)
- 09h55 CT-Based Predictive Model for Myocardial Ischemia in Anomalous Aortic Origin of Coronary Artery. [Rajesh Krishnamurthy](#)
- 10h01 Conservative vs. surgical treatment of parapneumonic effusions in children - where are the ultrasonographic boundaries? [Svetlana Balj Barbir](#)
- 10h07 Congenital Variants and Anomalies of the Aortic Arch - single centre study. [Vesna Topić](#)
- 10h13 Dynamic Contrast Magnetic Resonance Lymphangiography (DCMRL) in Neonates and Children: categorizing imaging findings to predict outcome and to guide therapy. [Ralph Gnannt](#)
- 10h19 Discussion
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **ORAL PRESENTATIONS OF CHOSEN YOUNG PAEDIATRIC RADIOLOGISTS (3)**
- 11h00 Radiomics and chemotherapy response in paediatric patients with Ewing-Sarcoma. [Julia Miedler](#)
- 11h20 MRI-DWI in paediatric renal tumors - *Correlation with histopathology*. [Justine N. Van der Beek](#)
- 11h40 Mucopolysaccharidosis - Demographics and Imaging Findings. [Ercan Ayaz](#)
- 12h00** Jacques Lefebvre lecture -Penile reconstructive surgery in children and adolescents.
[Miroslav Đorđević](#)
- 12h30** **LUNCH**
- 13h30 | 15h00** **SCIENTIFIC SESSION: Oncology and Interventional Radiology**
Chairs: Rutger A.J. Nievelstein, Ralph Gnannt
- 13h30 Plenary lecture: Staging and response assessment in paediatric lymphoma: an update!
[Rutger A.J. Nievelstein](#)
- 13h55 Imaging of paediatric mandibular tumors. [Birgit Spors](#)
- 14h01 Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age. [Gozde Ozer](#)
- 14h07 Super-selective embolisation for traumatic non-ischæmic priapism; a case series.
[Jonathan Bevan](#)
- 14h19 Diffuse midline glioma different locations and tips differential diagnosis. [Marta Gomez Chiari](#)
- 14h25 Retrospective series of renal biopsies in paediatric patients from 2016 to 2022: analysis of complications and outcomes using a standardized protocol. [Marta Gonzales Carballes](#)
- 14h31 Feasibility and diagnostic accuracy of early postoperative MRI after resection of neuroblastic tumors. [Maryanna Chaika](#)
- 14h37 Two-year experience of Treatment of Osteoid Osteomas and Osteoblastomas in a Paediatric tertiary hospital. [Rituparna Saha](#)
- 14h43 Preoperative Multimodal Assessment of Functional and Metabolic Tumor Volume in Paediatric Rhabdomyosarcoma. [Simon Männlin](#)
- 14h49 Virtual reality glasses: distraction technique to reduce sedation rates in children undergoing interventional radiology procedures. [Elisa Aguirre Pascual](#)
- 14h55 Discussion
- 15h10** **COFFEE BREAK**
- 15h30 | 17h00** **SCIENTIFIC SESSION: Child abuse and Post mortem**
Chairs: Rick R. Van Rijn, Owen Arthurs
- 15h30 Plenary lecture: Child abuse - a post-mortem forensic perspective. [Rick R. Van Rijn](#)
- 15h55 Rib fracture diagnosis in suspected abuse: computed tomography or radiographs (RECEPTOR): a multicentre diagnostic accuracy observational study. [Nasser Alzahrani](#)
- 16h01 International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse. [Jai Sidpra](#)
- 16h07 Combined Prenatal US and Post-mortem fetal MRI: can they replace conventional autopsy for fetal body abnormalities? [Marine Moeremans](#)
- 16h13 Submission Preview: Structuring International Paediatric Radiology coverage at a major United States Academic Children's Hospital. [Benjamin Taragin](#)

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

16h19	CT carbon calculator. Michael Jackson
16h25	Prevalence of metaphyseal fractures in infants with and without evidence of abusive head injury: Does shaking cause metaphyseal fractures? Um-Kalsum Rashed
16h31	When Greens Are Not So Good for You. Soft Tissue Foreign Bodies: a Radiology and Plastic Surgery Perspective. Fiona Katherine McCurdie
16h37	Imaging findings of head and neck juvenile xanthogranuloma, in 10 patients. Francois Chalard
16h43	Imaging findings of pulmonary and extrapulmonary sarcoidosis in children. Gozde Ozer
16h49	Significant increase in complicating upper respiratory tract infections in children during the 2022/2023 winter season - a post COVID effect? Corona Metz
16h55	Clinico-radiological rounds with ultrasonography in neonatal intensive care unit. Dhananjaya Kotebagilu Narayana Vamyanmane
17h01	Discussion
17h30 18h30	JESPER SESSION - Daily routine challenges for young paediatric radiologists Chair: Julian Jürgens
17h30	Challenges for young paediatric radiologists. Julian Jürgens
17h41	Challenge 1: The difficult child. Catherine Owens (TBC)
17h52	Challenge 2: Talk to parents. Alexia Dabadie
18h03	Challenge 3: Talk about mistakes. Erich Sorantin
18h14	Challenge 4: How to compete with hard cases. Rutger Jan Nievelstein
18h25	Discussion
18h30	END OF SESSION

THURSDAY, JUNE 8 - MEDITERRANEAN/ADRIATIC HALL

09h00 09h30	CEUS Hands-On Workshop
10h00 10h30	CEUS Hands-On Workshop
11h00 11h30	CEUS Hands-On Workshop
12h00 12h30	CEUS Hands-On Workshop
14h00 14h30	CEUS Hands-On Workshop
15h30 16h00	CEUS Hands-On Workshop
16h15 16h45	CEUS Hands-On Workshop
17h00 17h30	CEUS Hands-On Workshop

BELGRADE, SERBIA / [Crowne Plaza Hotel](#)

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ANNUAL MEETING

FRIDAY, JUNE 9 - PACIFIC HALL

- 09h00 | 10h40** **CHILED ABUSE TF: KEEPING AN OPEN MIND**
Chairs: Amaka C Offiah
 Introduction. Amaka C Offiah
 09h00 TEN-4-FACEsp: A mnemonic not to forget. Michelle Nagtegaal
 09h02 Alternative diagnoses: what else besides abusive fractures? Annmarie Jeanes
 09h20 Alternative diagnoses: What else besides AHT? Kshitij Mankad
 09h38 Bayes in child abuse. Michelle Nagtegaal
 09h56 East meets West: Differences between Eastern and Western Europe?
 10h14 Panel discussion. Amaka C Offiah, Maria Raissaki, Damjana Ključevšek, Irmina Sefić, Goran Roić, Jovan Lovrenski
 Closing Remarks. Amaka C Offiah
- 10h27**
10h30 **COFFEE BREAK**
- 11h00 | 12h30** **VOIDING DYSFUNCTIONS**
Chairs: Damjana Ključevšek, Erich Sorantin
 11h00 Classification, pathogenesis and clinical approach to voiding dysfunctions, urinary incontinence and enuresis in children. Andrea Roić
 11h27 The role of ultrasonography techniques in children with voiding disfunction. Damjana Ključevšek
 11h54 Non-ultrasound imaging methods in voiding dysfunctions. Erich Sorantin
 12h21 Discussion
- 12h30** **LUNCH**
- 13h30 | 15h00** **MEDICO-LEGAL CHALLENGES IN PAEDIATRIC RADIOLOGY - WHAT DO I NEED TO KNOW**
Chairs: Joanna Kasznia-Brown, Rick R. Van Rijn
 13h30 Most common diagnostic errors in paediatric radiology. Rick R. van Rijn
 13h50 Medico-legal aspects of radiological reports in suspected child abuse. Amaka Offiah
 14h10 When you are called to the court. Owen Arthurs
 14h30 Perspective from the judge. Wilma Duijst
 14h50 Discussion
- 15h00** **COFFEE BREAK**
- 15h30 | 17h00** **ABDOMINAL TF**
Chairs: Lil-Sofie Ording Muller, Philippe Petit
 15h30 Imaging in steatosis, current practice and knowledge. Seema Toso
 15h55 Discussion
 16h00 Basic elastography and its clinical applications. Jochen Herrmann, Martijn Verhagen
 16h25 Discussion
 16h30 Around the world of intussusception. Giulia Perucca
 16h55 Discussion
- 17h00** **CLOSING CEREMONY**

FRIDAY, JUNE 9 - ATLANTIC HALL

- 09h00 | 10h40** **SCIENTIFIC SESSION: GI and GU**
Chairs: Giulia Perucca, Seema Toso
 09h00 Plenary lecture: Paediatric MR lymphangiography. Jordan Rapp
 09h25 Shear wave elastography and shear wave dispersion correlated to biopsy in scheduled follow-up of paediatric liver grafts. Ivan Cetinic
 09h31 Liver MR and US elastography correlation to 4D flow and lymphatic stasis in paediatric Fontan Circulation. Charlotte de Lange
 09h37 Liver shear wave elastography and portal venous doppler estimation before and after meal in paediatric patients with diffuse liver disease. Tijana Radović
 09h43 Quantified Motility MR Enterography Response Assessment in Paediatric Inflammatory Bowel Disease. Riwa Meshaka
 09h49 Hepato-renal index on ultrasound in overweight children as non-invasive quantitative imaging Biomarker. Virginie Frings
 09h55 Ultrasound shear-wave elastography and attenuation imaging compared to histology in paediatric patients. Michael Zellner
 10h01 Is ASL MRI the new tool for reliable renal perfusion quantification? Study of quality and reliability of repeated measurements. Tijana Radović
 10h07 Ovarian Torsion: Challenges in Sonographic-Surgical discordance. Anna Seehofnerova
 10h13 Antibiotic Prophylaxis for Micturating Cystourethrography: Findings from a National Multidisciplinary Survey. Harsimran Laidlow-Singh
 10h19 Comparison of superb microvascular imaging with Color and Power Doppler imaging in the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

	evaluation of testicular vascularity with Doppler Ultrasound for determination of viability in undescended testes in children. Mustafa Faraşat
10h25	An optimised diagnostic imaging pathway for suspected renovascular hypertension in children. Rita Pina Prata
10h31	Discussion
10h40	COFFEE BREAK
11h00 12h30	MUSCULOSKELETAL TF
	Chairs: Karen Rosendahl , Laura Tanturri de Horatio
11h00	Introduction. Karen Rosendahl
11h05	Ultrasound of the joints in children; MSK TF recommendations on techniques and Measurements. Céline Habre
11h25	Novel standards for knee ultrasound. Silvia Costa Dias
11h45	MRI and advanced imaging of the growth plate in the adolescent and young adult. Ola Krivist
12h15	Discussion
12h30	LUNCH
13h30 15h00	SCIENTIFIC SESSION: MSK and AI
	Chairs: Karen Rosendahl , Susan Shelmerdine
13h30	Plenary lecture: Imaging Musculoskeletal Manifestations of Paediatric Hematologic Malignancies. Karen Rosendahl
13h55	Role of T2-weighted MR radiomics in the prediction of FOXO1 fusion-positive rhabdomyosarcoma. Adarsh Ghosh
14h01	Paediatric bone age estimation from lateral elbow radiographs using a machine learning-mediated approach. Alcide Alessandro Azzena
14h07	Fully automated measurement of Cobb angle in coronal plane spine radiographs. Christoph Salzlechner
14h13	Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort. Daniel Grafe
14h19	An initial approach of Artificial intelligence in paediatric brain segmentation and quantification using Magnetic Resonance Imaging. Dhananjaya Kotebagilu Narayana Vamyanmane
14h25	Preferential involvement of the pelvis and hips along with active sacroiliitis in chronic nonbacterial osteomyelitis. Ercan Ayaz
14h31	Diagnostic performance of an artificial intelligence aid for the detection of paediatric appendicular skeletal fractures. Irmhild Altmann-Schneider
14h37	ZTE sequences with AI-based image reconstruction for 3D evaluation of the temporomandibular joint and craniofacial bones in children with juvenile idiopathic arthritis. Nadja Kocher
14h43	Artificial intelligence-based image reconstruction of abdominal MRI in children. Vanda Pocepcova
14h49	Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DW-MRI) in tumoral and Non-tumoral paediatric Bone Marrow Diseases (BMD). Tatiana Fazecas
14h55	Discussion
15h00	COFFEE BREAK
15h30 17h00	POST MORTEM TF
	Chair: Owen Arthurs
15h30	Introduction. Owen Arthurs
15h35	Post mortem imaging - how to get started. Aurelie D'hondt
16h00	Post mortem CT - how to report. Rick R. van Rijn
16h25	How do I pay for post mortem imaging? Owen Arthurs
16h50	Discussion
17h00	END OF SESSION

FRIDAY, JUNE 9 - MEDITERRANEAN/ADRIATIC HALL

09h00 09h30	CEUS Hands-On Workshop
10h00 10h30	CEUS Hands-On Workshop
11h00 11h30	CEUS Hands-On Workshop
14h00 14h30	CEUS Hands-On Workshop
15h30 16h00	CEUS Hands-On Workshop
16h15 16h45	CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



INDUSTRY SIMPOSIA - GOLD

WEDNESDAY, JUNE 7



12H30 | 12H50 - HALL 2

“Little super heroes deserve super powers- what MRI can offer for pediatric patients”

INDUSTRY LECTURE - BRONZE

WEDNESDAY, JUNE 7



19H10 | 19H20 - HALL 1

Promotional video - Role of Tesla and Pupin inventions on the development of radiology over the last century

INDUSTRY LECTURE - SILVER

THURSDAY, JUNE 8



10H30 | 10H40 - HALL 1

Alexandre PARPALEIX - AI in MSK : innovations in pediatric Imaging from MILVUE

INDUSTRY SYMPOSIA - GOLD

THURSDAY, JUNE 8



12H30 | 12H50 - HALL 2

TBA

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

INDUSTRY LECTURE - SILVER

THURSDAY, JUNE 8

mindray

healthcare within reach

15H00 | 15H10 - HALL 1

Niccolo Parri - Why, What and How? An exploration of the potentials and why the time is right for paediatric PoCUS in Emergency medicine

13H10 | 13H30 - HALL 3

WS - Mindray introduction
The Radiology solution on Pediatrics by Resona R9

INDUSTRY SIMPOSIA - GOLD

THURSDAY, JUNE 8

SIEMENS
Healthineers

17H00 | 17H30 - HALL 1

Dr Paulina Chodnicka, Children`s Memorial Warsaw, Poland - MR imaging in liver cancer
TBA - Photon Counting CT

INDUSTRY LECTURE - BRONZE

FRIDAY, JUNE 9



10H40 | 11H00 - HALL 1

Daniel Grafe - Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort
Cristoph Salzlechner - Fully automated measurement of Cobb angle in coronal plane spine radiographs

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



**CROWN PLAZA HOTEL
CONFERENCE CENTER - MEZANINE
CONFERENCE HALLS & EXHIBITION AREA LAYOUT**



BELGRADE, SERBIA / Crowne Plaza Hotel **05 - 09 June**

43rd Postgraduate Course**Day 1 – Monday, 5th June 2023**

09.30 – 11.00 Fetal MRI for beginners
 11.30 – 13.00 Paediatric urethral pathology
 14.00 – 15.30 Endocrine diseases in children
 16.00 – 17.30 Juvenile idiopathic arthritis

Day 2 – Tuesday, 6th June 2023

08.30 – 10.00 Paediatric cardiac CT for beginners
 10.30 – 12.00 Imaging of diaphragmatic pathology
 12.00 – 13.00 Interstitial lung diseases
 14.00 – 15.40 Neonatal neuroradiology
 15.40 – 16.40 Integrative diagnostics of the gastro-intestinal tract
 17.10 – 17.55 Jesper lecture (Hot topics in paediatric radiology in the next decade)

57th Annual Meeting**Day 3 – Wednesday, 7th June 2023**

09.00 - 10.30	09.00 - 10.30	10.00 - 12.30
Cardiothoracic Taskforce: Lung and cardiovascular Infections in immunocompetent and immunocompromised children	Fetal Imaging Taskforce Normal and pathological spinal cord	CHOP workshop: Intravenous Contrast-enhanced ultrasound (CEUS)
11.00 – 12.30	11.00 – 12.30	
CT and dose Taskforce: Patient shielding & CT protocols made easy	Neuroradiology Taskforce	
13.30 – 15.00	13.30 – 15.00	13.30 – 15.25
ESPR meets Image Gently Alliance: Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care	Interventional radiology Taskforce	Intracavitary CEUS
15.30 - 17.00	15.30 - 17.10	16.00 – 16.30 CEUS Hands-On Workshop
Outreach Taskforce: Imaging of unusual infections in children – what's new?	Scientific session: Neuroradiology and Fetal Imaging	16.45 – 17.15 CEUS Hands-On Workshop 17.30 – 18.45 Two CEUS Hands-On Workshops

Day 4 – Thursday, 8th June 2023

09.00 - 10.30	09.00 - 10.30	
WFPI session	Scientific session: Cardiothoracic	09.00 - 09.30 CEUS Hands-On Workshop 10.00 – 10.30 CEUS Hands-On Workshop
11.00 – 12.55	11.00 – 12.30	
Artificial Intelligence Taskforce	Oral presentations of chosen young paediatric radiologists	11.00 – 11.30 CEUS Hands-On Workshop 12.00 – 12.30 CEUS Hands-On Workshop
13.30 – 15.00	13.30 – 15.00	
Research session: How to succeed	Scientific session: Oncology and Interventional Radiology	14.00 – 14.30 CEUS Hands-On Workshop 15.30 – 16.00 CEUS Hands-On Workshop
15.30 - 17.00	15.30 - 17.00	
Oncology Taskforce	Scientific session: Child abuse and Post mortem	16.15 – 16.45 CEUS Hands-On Workshop 17.00 – 17.30 CEUS Hands-On Workshop
	17.30 - 18.30	
	Jesper session: Daily routine challenges for young paediatric radiologists	

Day 5 – Friday, 9th June 2023

09.00 - 10.40	09.00 - 10.40	09.00 - 09.30 CEUS Hands-On Workshop
Child abuse Taskforce: Keeping an open mind	Scientific session: GI and GU	10.00 – 10.30 CEUS Hands-On Workshop
11.00 – 12.30	11.00 – 12.30	
Voiding disfunctions	Musculoskeletal Taskforce	11.00 – 11.30 CEUS Hands-On Workshop
13.30 – 15.00	13.30 – 15.00	
Medico-legal challenges in paediatric radiology – what do I need to know	Scientific session: MSK and AI	14.00 – 14.30 CEUS Hands-On Workshop
15.30 - 17.00	15.30 - 17.00	15.30 – 16.00 CEUS Hands-On Workshop
Abdominal Taskforce	Post modern Taskforce	16.15 – 16.45 CEUS Hands-On Workshop

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

PROGRAMME AND E-ABSTRACT BOOK

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Dear colleagues and friends,

The **57th ESPR Annual Meeting & 43rd Postgraduate Course in Belgrade, Serbia from 5-9 June 2023. are ahead of us.**

It is our great privilege to organize this **most important meeting in European paediatric radiology** only for the second time in Southeast Europe (SEE). Therefore, in parallel with the **ESPR meeting global relevance**, this event has been seen as **a chance for a generation of paediatric radiologists in the SEE region** to leap forward, speed up their development and catch up with the most contemporary knowledge and practices in paediatric radiology worldwide. We trust this goal will be achieved.

The **motto** of the ESPR 2023 is "**Building new bridges**".

We emphasize the need for further **enhancing relations between SEE paediatric radiology with the rest of the world** and the need for continual growth of interdisciplinary relations, while the **importance of clinical-radiological cooperation has been highlighted**. A number of sessions were structured to include a clinician, paediatrician or paediatric surgeon, to point out the clinical issues and aspects of what radiologists do, with a goal to improve our mutual understanding.

The most current topics of paediatric radiology and the **potentials of their application in our daily practice have been covered in more than 60 sessions, plenary lectures, workshops and other attractive conference formats. Almost 100 international and regional leaders** in different domains of paediatric radiology will enrich us with their expertise and experience, as invited speakers and panellists. **Hundreds of colleagues from all over the world will join us on this occasion.**

We are certain that **you will benefit from this meeting in many different ways**, getting the best of state-of-the-art practices, exchanging knowledge and experience, strengthening existing and creating new professional and personal relationships, and also having some time to enjoy in Belgrade vibrant and dynamic life, widely recognized internationally.

With this in mind, we wish you a warm welcome!



Polina Pavićević

Prof. Polina Pavićević
Congress President



Jovan Lovrenski

Prof. Jovan Lovrenski
Congress President

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

PROGRAMME

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



PROGRAMME AT-THE-GLANCE

43rd Postgraduate Course

Day 1 – Monday, 5th June 2023

09h30 | 11h00 Fetal MRI for beginners
11h30 | 13h00 Paediatric urethral pathology
14h00 | 15h30 Endocrine diseases in children
16h00 | 17h30 Juvenile idiopathic arthritis

Day 2 – Tuesday, 6th June 2023

08h30 | 10h00 Paediatric cardiac CT for beginners
10h30 | 12h00 Imaging of diaphragmatic pathology
12h00 | 13h00 Interstitial lung diseases
14h00 | 15h40 Neonatal neuroradiology
15h40 | 16h40 Integrative diagnostics of the gastro-intestinal tract
17h10 | 17h55 Jesper lecture (Hot topics in paediatric radiology in the next decade)

57th Annual Meeting

Day 3 – Wednesday, 7th June 2023

09h00 | 10h30
Cardiothoracic Taskforce: Lung and cardiovascular Infections in immunocompetent and immunocompromised children
11h00 | 12h30
CT and dose Taskforce:
Patient shielding & CT protocols made easy
13h30 | 15h00
ESPR meets Image Gently Alliance:
Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care
15h30 | 17h00
Outreach Taskforce:
Imaging of unusual infections in children – what's new?

09h00 | 10h30
Fetal Imaging Taskforce
Normal and pathological spinal cord
11h00 | 12h30
Neuroradiology Taskforce

10h00 | 12h30
CHOP workshop: Intravenous Contrast-enhanced ultrasound (CEUS)

13h30 | 15h00
Interventional radiology Taskforce

13h30 | 15h25
Intracavitary CEUS

16h00 | 16h30 CEUS Hands-On Workshop

15h30 | 17h10
Scientific session:
Neuroradiology and Fetal Imaging

16h45 | 17h15 CEUS Hands-On Workshop
17h30 | 18h45 Two CEUS Hands-On Workshops

Day 4 – Thursday, 8th June 2023

09h00 | 10h30
WFPI session

11h00 | 12h55
Artificial Intelligence Taskforce

13h30 | 15h00
Research session: How to succeed

09h00 | 10h30
Scientific session:
Cardiothoracic
11h00 | 12h30
Oral presentations of chosen young paediatric radiologists
13h30 | 15h00
Scientific session: Oncology and Interventional Radiology
15h30 | 17h00

09h00 | 09h30 CEUS Hands-On Workshop
10h00 | 10h30 CEUS Hands-On Workshop

11h00 | 11h30 CEUS Hands-On Workshop
12h00 | 12h30 CEUS Hands-On Workshop

14h00 | 14h30 CEUS Hands-On Workshop
15h30 | 16h00 CEUS Hands-On Workshop

15h30 | 17h00
Oncology Taskforce
Scientific session:
Child abuse and Post mortem
17h30 | 18h30

16h15 | 16h45 CEUS Hands-On Workshop
17h00 | 17h30 CEUS Hands-On Workshop

Jesper session: Daily routine challenges for young paediatric radiologists

Day 5 – Friday, 9th June 2023

09h00 | 10h40
Child abuse Taskforce: Keeping an open mind
11h00 | 12h30
Voiding dysfunctions
13h30 | 15h00
Medico-legal challenges in paediatric radiology – what do I need to know
15h30 | 17h00
Abdominal Taskforce

09h00 | 10h40
Scientific session: GI and GU
11h00 | 12h30
Musculoskeletal Taskforce
13h30 | 15h00
Scientific session: MSK and AI
15h30 | 17h00
Post modern Taskforce

09h00 | 09h30 CEUS Hands-On Workshop
10h00 | 10h30 CEUS Hands-On Workshop

11h00 | 11h30 CEUS Hands-On Workshop

14h00 | 14h30 CEUS Hands-On Workshop
15h30 | 16h00 CEUS Hands-On Workshop

16h15 | 16h45 CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

POST GRADUATE COURSE

MONDAY, JUNE 5 - EXHIBITION HALL

09h00 09h30	OPENING CEREMONY. Polina Pavičević, Jovan Lovrenski
09h30 11h00	FETAL MRI FOR BEGGINERS Chairs: Martin Kyncl, Erika Rubesova
09h30	Building a Fetal MRI program in practice. Teresa Victoria
09h57	Fetal MRI for the diagnosis of body anomalies. Erika Rubesova
10h24	Fetal MRI for the diagnosis of neurological anomalies. Martin Kyncl
10h51	Discussion
11h00	COFFEE BREAK
11h30 13h00	PAEDIATRIC URETHRAL PATHOLOGY Chairs: Frederika Papadopoulou, Polina Pavičević
11h30	Reconstructive surgery of urethra in children. Miroslav Đorđević
11h50	Diagnosis of congenital urethral anomalies by voiding cystourethrography. Polina Pavičević
12h10	CeVus of urethra. Frederika Papadopoulou
12h30	Discussion
13h00	LUNCH
14h00 15h30	ENDOCRINE DISEASES IN CHILDREN Chairs: Maria Raissaki, Lil-Sofie Ordning Muller
14h00	Disorders of Puberty: An Approach to Diagnosis and Management. Vera Zdravković
14h20	Neuroimaging for the paediatric endocrinologist. Sandra Nedović
14h40	Imaging of the thyroid and parathyroid glands in children. Maria Raissaki
15h00	Female Pelvis: Precocious Puberty – Primary Amenorrhea. Lil-Sofie Ordning Muller
15h20	Discussion
15h30	COFFEE BREAK
16h00 17h30	JUVENILE IDIOPATHIC ARTHRITIS Chairs: Damjana Ključevšek, Laura Tanturri de Horatio
16h00	The role of radiography in diagnosing, monitoring and predicting JIA. Damjana Ključevšek
16h20	The role of ultrasound in diagnosing, monitoring and predicting JIA. Iwona Sudol-Szopinska
16h40	The role of MRI in diagnosing, monitoring and predicting JIA. Laura Tanturri de Horatio
17h00	Clinical perspective on JIA imaging. Tadej Avčín
17h20	Discussion
17h30	END OF SESSION

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

POST GRADUATE COURSE

TUESDAY, JUNE 6 - EXHIBITION HALL

08h30 10h00	PAEDIATRIC CARDIAC CT FOR BEGINNERS Chairs: Aurelio Secinaro, Pablo Caro-Dominguez Technique, indications, hardware, ECG-gating and contrast. Joost van Schuppen Exciting cases: congenital heart disease. Lucia Riaza-Martin 08h30 Exciting cases: coronary arteries and aortic anomalies. Maria Navallas 08h57 Discussion 09h24 09h51
10h00	COFFEE BREAK
10h30 12h00	IMAGING OF DIAPHRAGMATIC PATHOLOGY Chairs: Teresa Victoria, Jovan Lovrenski 10h30 Ultrasound imaging of diaphragmatic motion: the technique. Lauren May 10h50 Ultrasound imaging of diaphragm: the cases. Jovan Lovrenski 11h05 The role of MRI in evaluation of functional diaphragmatic disorders. Pierluigi Ciet 11h25 Fetal and postnatal MRI in evaluation of diaphragmatic hernia. Teresa Victoria 11h50 Discussion
12h00 13h00	INTERSTITIAL LUNG DISEASES Chair: Alistair Calder 12h00 Radiological - pathological correlation in children with childhood ILD: a structured approach to the diagnosis. Pierluigi Ciet and Jan von der Thusen 12h50 Discussion
13h00	LUNCH
14h00 15h40	NEONATAL NEURORADIOLOGY Chairs: Katarina Koprivšek, Savvas Andronikou 14h00 Brain CEUS - where are we now? Misun Hwang 14h20 MRI in cerebral sinovenous thrombosis - clear-cut or dilemma? Katarina Koprivšek 14h40 The brain's kryptonite: a practical approach to punctate white matter lesions in neonates. Felice D'Arco 15h00 Delayed MR Imaging of the brain in neonatal hypoxic ischaemic injury: lessons from the developing world. Savvas Andronikou 15h20 Discussion
15h40 16h40	INTEGRATIVE DIAGNOSTICS OF THE GASTRO-INTESTINAL TRACT. Erich Sorantin, Andrea Huber-Zeyringer
16h40	COFFEE BREAK
17h10 17h55	JESPER LECTURE 17h10 Hot topics in paediatric radiology in the next decade. Kassa Darge 17h55 END OF SESSION

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR 2023

57th ANNUAL MEETING & 43rd POST GRADUATE COURSE



ANNUAL MEETING

WEDNESDAY, JUNE 7 - PACIFIC HALL

- 08h30 | 09h00 **OPENING CEREMONY.** Polina Pavićević, Jovan Lovrenski
- 09h00 | 10h30 **CARDIOTHORACIC TF: LUNG AND CARDIOVASCULAR INFECTIONS IN IMMUNOCOMPETENT AND IMMUNOCOMPROMISED CHILDREN**
Chairs: Pablo Caro-Dominguez, Jovan Lovrenski
- 09h00 Imaging of complicated pneumonia - from CR to MRI. Efthymia Alexopoulou
09h20 Complicated pneumonia from pulmonologist's point of view - raising a level of mutual understanding and cooperation. Silvia Carraro
- 09h40 Imaging of paediatric cardiac infections. Daniel Gräfe
10h00 Lung infections in immunocompromised children. Alistair Calder
10h20 Discussion
- 10h30 **COFFEE BREAK**
- 11h00 | 12h30 **CT AND DOSE TF: PATIENT SHIELDING AND CT PROTOCOLS MADE EASY - "Patient shielding is no longer needed"**
Chairs: Claudio Granata, Erich Sorantin
- 11h00 Pros. Claudio Granata
11h15 Cons. Erich Sorantin
11h30 Discussion
11h35 Radiologic imaging during pregnancy: dose exposure and related risks for the fetus. Joanna Kasznia-Brown
11h50 Discussion
11h55 CT Protocols made easy - an ultrafast guide. Erich Sorantin
12h25 Discussion
- 12h30 **LUNCH**
- 13h30 | 15h00 **ESPR MEETS IMAGE GENTLY ALLIANCE: Voices and Choices for Children - Diagnostic Reference Levels and Cumulative Radiation Dose Monitoring and Relevance to Patient Care**
Chairs: Donald Frush, Claudio Granata
- 13h30 Introduction. Donald Frush
13h35 Diagnostic Reference Levels: European and North American approach. Claudio Granata, Donald Frush
14h00 Cumulative Radiation Dose. Donald Frush
14h25 Panel discussion with audience participation. Claudio Granata, Donald Frush, Erich Sorantin
- 15h00 **COFFEE BREAK**
- 15h30 | 17h00 **OUTREACH TF SESSION: Imaging of unusual infections in children - what's new?**
Chairs: Joanna Kasznia-Brown, Tatiana Fazecas
- 15h30 Pre - and postnatal evaluation of congenital infections. Tatiana Fazecas
15h47 Paediatric Pulmonary TB - Current perspectives and future directions. Kushaljit Singh Sodhi
16h04 COVID and atypical chest infections. Domen Plut
16h21 Challenges in imaging intracranial infections. Savvas Andronikou
16h38 Imaging findings of paediatric hydatid disease. Carlos Ugas
16h55 Discussion
- 17h30 | 19h00 **GENERAL ASSEMBLY**

WEDNESDAY, JUNE 7 - ATLANTIC HALL

- 09h00 | 10h30 **FETAL TF: NORMAL AND PATHOLOGICAL SPINAL CORD**
Chair: Marie Cassart, Catherine Garel
- 09h00 Normal sonographic patterns of the fetal spine and spinal cord. Catherine Garel and Eleonore Blondiaux
09h15 MRI of the fetal spinal cord. Andrea Rossi
09h50 Fetal spinal cord pathologies: pre - and postnatal correlations. Catherine Garel
10h20 Discussion
- 10h30 **COFFEE BREAK**
- 11h00 | 12h30 **NEURORADIOLOGY TF**
Chairs: Maria Argyropoulou, Catherine Adamsbaum
- 11h00 Standardised protocols for magnetic resonance imaging in paediatric head and neck pathologies: a consensus statement. Felice D'Arco
11h27 New and revised brain tumor types. Volodia Dangouloff-Ros
11h54 AI in paediatric neuro-oncology. Kish Mankad
12h21 Discussion

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

12h30	LUNCH
13h30 15h00	INTERVENTIONAL RADIOLOGY TF Chairs: Simon McGuirk, Stéphanie Franchi-Abella
13h30	Paediatric IR in oncology. Fernando Gomez
13h57	Image Guided Drain Insertion - Pleural Effusion, Abscesses and other indications. Ralph Gnannt
14h12	Paediatric Interventional Radiology at Kantha Bopha Hospital in Cambodia. Ung Sithaung
14h51	Discussion
15h00	COFFEE BREAK
15h30 17h10	SCIENTIFIC SESSION: NEURORADIOLOGY AND FETAL IMAGING Chairs: Marya Argyropoulou, Marrie Cassart
15h30	Plenary lecture - Paediatric MR encephalography. Tim Roberts
15h55	MRI and Neurosonogram correlation of paediatric brain with dystocia. Dhananjaya Kotebagilu Narayana Vamyanmane
16h01	An easy applicable brain myelin quantification method. Efstratios Karavasilis
16h07	Cerebral Blood Flow Patterns in Preterm and Term Neonates Assessed with Pseudo-Continuous Arterial Spin Labeling Perfusion MRI. Eleonora Piccirilli
16h13	Isolated hypogonadotropic hypogonadism in adolescence: Do we need to measure pituitary gland? A retrospective MRI study. Ercan Ayaz
16h19	Intraoperative MRI assessment of the tissue damage during laser ablation of hypothalamic hamartoma. Felice D'Arco
16h25	Do children with suspected inflicted skull fractures really need an MRI? Harriet Edwards
16h31	Frequency of Cerebellar-Thalamic Circuit Involvement in Term Hypoxic-Ischemic Injury and Relationship to MRI Pattern of Injury. Luis Octavio Tierradentro-García
16h37	Image Quality Transfer can improve the contrast and lesion characterisation in low-field MRI. Matteo Figini
16h43	Is there a difference in subcortical volume in children with non-lesion and lesion epilepsy? Zorica Joković
16h49	Contributions of Adding a Routine Mastoid Fontanel Approach to Anterior Transfontanel Evaluation in the Newborn. Sevinc Tasar
16h55	Discussion
17h10	END OF SESSION

WEDNESDAY, JUNE 7 - MEDITERRANEAN/ADRIATIC HALL

10h00 12h30	Intravenous Contrast-enhanced Ultrasound (CEUS)
A. IV CEUS	
10h00 10h45	SESSION 1: Intravenous CEUS procedure
10h00	CHOP sonographer
10h05	Contrast preparation. Alyx Escamilla & Elizabeth Brennan
10h05	Intravenous CEUS technique - phantom live demonstration. Alyx Escamilla & Dr. Susan J. Back
10h20	Safety of intravenous and intracavitary CEUS in children. Dr. Aikaterini Ntoulia
10h35	Questions - Break
10h45 11h25	SESSION 2: Intravenous CEUS applications
10h45	Hepatic CEUS: routine examinations. Dr. Rebecca Dennis
10h55	Hepatic CEUS: trouble shooting tool. Dr. Rebecca Dennis
11h05	Interventional radiology: Intra-vascular applications of CEUS. Dr. Abhay Srinivasan
11h15	Questions - Break
11h25 12h30	SESSION 3: Intravenous CEUS in advanced applications
11h25	Trouble shooting with intravenous CEUS outside of the liver. Dr. Susan J. Back & Dr. Aikaterini Ntoulia
11h45	Bowel CEUS: evaluation of inflammatory bowel disease. Dr. Damjana Ključevšek
11h55	Bowel CEUS in the intensive care unit. Dr. Misun Hwang
12h05	Brain CEUS. Dr. Misun Hwang
12h15	Questions - Break
12h25	Session A wrap up
12h30	LUNCH

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

B. INTRACAVITARY CEUS

- 13h30 | 13h45** **SESSION 1: Intravesical CEUS procedure**
13h30 Intracavitary CEUS technique - phantom live demonstration. [Elizabeth Brennan & Dr. Susan J. Back](#)
- 13h45 | 14h25** **SESSION 2: Contrast-enhanced voiding urosonography (ceVUS)**
13h45 CeVUS in vesicoureteral reflux. [Dr. Kassa Darge](#)
13h55 CeVUS in urethral assessment. [Dr. Viviana Patricia Beltran Salazar](#)
14h05 Advanced GU applications. [Dr. Kassa Darge](#)
14h15 Questions - Break
- 14h25 | 14h55** **SESSION 3: Interventional Radiology: intracavitary applications**
14h25 Procedural intra-cavitary applications of CEUS in IR. [Dr. Abhay Srinivasan](#)
14h35 Intralymphatic applications of CEUS. [Fernando Escobar](#)
14h45 Questions - Break
- 14h55 | 15h25** **SESSION 4: Future directions**
14h55 Pediatric CEUS highlights: what is the future direction of CEUS. [Dr. Kassa Darge](#)
15h10 Session B wrap up - Course closing
- 15h25** **COFFEE BREAK**
- 16h00 | 16h30** **CEUS Hands-On Workshop**
- 16h45 | 17h15** **CEUS Hands-On Workshop**
- 17h30 | 18h15** **CEUS Hands-On Workshop**
- 18h15 | 18h45** **CEUS Hands-On Workshop**

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

THURSDAY, JUNE 8 - PACIFIC HALL

09h00 10h30	WFPI SESSION
09h00	Ultrasound imaging in paediatric neonatal care unit. Joanna Kasznia-Brown
09h17	Ultrasound imaging in vascular soft tissue lesions. Andres Garcia Bayce
09h34	Transperineal evaluation of genitourinary pathologies. Tatiana Fazecas
09h51	Tips and pitfalls in acute scrotal ultrasound. Andres Garcia Bayce
10h08	Contrast ultrasound in abdominal trauma. Kassa Darge
10h25	Discussion
10h30	COFFEE BREAK
11h00 12h55	ARTIFICIAL INTELLIGENCE TF
	Chair: Susan Shelmerdine
11h00	Intended and Unintended Consequence of AI for Paediatric Radiology. Susan Shelmerdine
11h23	My journey with AI. Jaishree Naidoo
11h46	AI conception to commercialization. Jeevesh Kapur
12h10	AI workshop. Jaishree Naidoo
12h30	LUNCH
13h30 15h00	RESEARCH SESSION: How to succeed
	Chairs: Amaka Offiah , Owen Arthurs
13h00	How to start and design your project. Savvas Andronikou
13h47	Looking for funding and grant application. Susan Shelmerdine
14h04	Making research easy. Owen Arthurs
14h21	How not to get into the trouble. Hansel Otero
14h38	Getting your research published: an editor's point of view. Amaka Offiah
14h55	Discussion
15h10	COFFEE BREAK
15h30 17h00	ONCOLOGY TF
	Chair: Rutger A.J. Nievelstein
15h30	Introduction. Rutger A.J. Nievelstein
15h35	Hybrid Imaging in paediatric oncology. Jürgen Schaefer
16h00	Imaging Biomarkers/Radiomics in paediatric oncology: first results from the PRIMAGE project. Diana Veiga Canuto
16h25	New therapeutics in paediatric solid tumors; what the paediatric radiologist should know! Miranda Dierselhuis
16h50	Discussion
17h00	END OF SESSION

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

THURSDAY, JUNE 8 - ATLANTIC HALL

- 09h00 | 10h30** **SCIENTIFIC SESSION: Cardiothoracic**
Chairs: Pablo Caro Dominguez, Franz Wolfgang Hirsch
- 09h00 Plenary lecture: What is real-time MRI and what is it used for in paediatric radiology?
[Franz Wolfgang Hirsch](#)
- 09h25 Late chest wall sequelae after neonatal corrective surgery for esophageal atresia: a real-time MRI study. [Daniel Grafe](#)
- 09h31 The usefulness of lung ultrasound in newborns and infants with respiratory pathologies.
[Emil Robert Stoicesku](#)
- 09h37 Dual Phase CTA evaluation of the Pulmonary Veins with Dual Energy and High-pitch ECG-Gated CTA. [Jordan Rapp](#)
- 09h43 Phase resolved functional lung (PREFUL) MRI detects improvement of perfusion and ventilation after Elexacaftor/Tezacaftor/Ivacaftor therapy in patients with Cystic Fibrosis.
[Martha Dohna](#)
- 09h49 UTE/ZTE lung-MRI in the diagnosis of tracheobronchial stenosis in children.
[Nadja Kocher](#)
- 09h55 CT-Based Predictive Model for Myocardial Ischemia in Anomalous Aortic Origin of Coronary Artery. [Rajesh Krishnamurthy](#)
- 10h01 Conservative vs. surgical treatment of parapneumonic effusions in children - where are the ultrasonographic boundaries? [Svetlana Balj Barbir](#)
- 10h07 Congenital Variants and Anomalies of the Aortic Arch - single centre study. [Vesna Topić](#)
- 10h13 Dynamic Contrast Magnetic Resonance Lymphangiography (DCMRL) in Neonates and Children: categorizing imaging findings to predict outcome and to guide therapy. [Ralph Gnannt](#)
- 10h19 Discussion
- 10h30 **COFFEE BREAK**
- 11h00 | 12h30** **ORAL PRESENTATIONS OF CHOSEN YOUNG PAEDIATRIC RADIOLOGISTS (3)**
- 11h00 Radiomics and chemotherapy response in paediatric patients with Ewing-Sarcoma. [Julia Miedler](#)
- 11h20 MRI-DWI in paediatric renal tumors - *Correlation with histopathology*. [Justine N. Van der Beek](#)
- 11h40 Mucopolysaccharidosis - Demographics and Imaging Findings. [Ercan Ayaz](#)
- 12h00** Jacques Lefebvre lecture -Penile reconstructive surgery in children and adolescents.
[Miroslav Dordević](#)
- 12h30** **LUNCH**
- 13h30 | 15h00** **SCIENTIFIC SESSION: Oncology and Interventional Radiology**
Chairs: Rutger A.J. Nijvelstein, Ralph Gnannt
- 13h30 Plenary lecture: Staging and response assessment in paediatric lymphoma: an update!
[Rutger A.J. Nijvelstein](#)
- 13h55 Imaging of paediatric mandibular tumors. [Birgit Spors](#)
- 14h01 Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age. [Gozde Ozer](#)
- 14h07 Super-selective embolisation for traumatic non-ischaemic priapism; a case series.
[Jonathan Bevan](#)
- 14h19 Diffuse midline glioma different locations and tips differential diagnosis. [Marta Gomez Chiari](#)
- 14h25 Retrospective series of renal biopsies in paediatric patients from 2016 to 2022: analysis of complications and outcomes using a standardized protocol. [Marta Gonzales Carballes](#)
- 14h31 Feasibility and diagnostic accuracy of early postoperative MRI after resection of neuroblastic tumors. [Maryanna Chaika](#)
- 14h37 Two-year experience of Treatment of Osteoid Osteomas and Osteoblastomas in a Paediatric tertiary hospital. [Rituparna Saha](#)
- 14h43 Preoperative Multimodal Assessment of Functional and Metabolic Tumor Volume in Paediatric Rhabdomyosarcoma. [Simon Männlin](#)
- 14h49 Virtual reality glasses: distraction technique to reduce sedation rates in children undergoing interventional radiology procedures. [Elisa Aguirre Pascual](#)
- 14h55 Discussion
- 15h10 **COFFEE BREAK**
- 15h30 | 17h00** **SCIENTIFIC SESSION: Child abuse and Post mortem**
Chairs: Rick R. Van Rijn, Owen Arthurs
- 15h30 Plenary lecture: Child abuse - a post-mortem forensic perspective. [Rick R. Van Rijn](#)
- 15h55 Rib fracture diagnosis in suspected abuse: computed tomography or radiographs (RECEPTOR): a multicentre diagnostic accuracy observational study. [Nasser Alzahrani](#)
- 16h01 International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse. [Jai Sidpra](#)
- 16h07 Combined Prenatal US and Post-mortem fetal MRI: can they replace conventional autopsy for fetal body abnormalities? [Marine Moeremans](#)
- 16h13 Submission Preview: Structuring International Paediatric Radiology coverage at a major United

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



16h19	States Academic Children's Hospital. Benjamin Taragin
16h25	CT carbon calculator. Michael Jackson
16h31	Prevalence of metaphyseal fractures in infants with and without evidence of abusive head injury: Does shaking cause metaphyseal fractures? Um-Kalsum Rashed
16h37	When Greens Are Not So Good for You. Soft Tissue Foreign Bodies: a Radiology and Plastic Surgery Perspective. Fiona Katherine McCurdie
16h43	Imaging findings of head and neck juvenile xanthogranuloma, in 10 patients. Francois Chalard
16h49	Imaging findings of pulmonary and extrapulmonary sarcoidosis in children. Gozde Ozer
16h55	Significant increase in complicating upper respiratory tract infections in children during the 2022/2023 winter season - a post COVID effect? Corona Metz
17h01	Clinico-radiological rounds with ultrasonography in neonatal intensive care unit. Dhananjaya Kotebagilu Narayana Vamymanane
17h30 18h30	Discussion
17h30 18h30	JESPER SESSION - Daily routine challenges for young paediatric radiologists
17h30	Chair: Julian Jürgens
17h41	Challenges for young paediatric radiologists. Julian Jürgens
17h52	Challenge 1: The difficult child. Catherine Owens (TBC)
18h03	Challenge 2: Talk to parents. Alexia Dabadie
18h14	Challenge 3: Talk about mistakes. Erich Sorantin
18h25	Challenge 4: How to compete with hard cases. Rutger Jan Nievelstein
18h30	Discussion
18h30	END OF SESSION

THURSDAY, JUNE 8 - MEDITERRANEAN/ADRIATIC HALL

09h00 09h30	CEUS Hands-On Workshop
10h00 10h30	CEUS Hands-On Workshop
11h00 11h30	CEUS Hands-On Workshop
12h00 12h30	CEUS Hands-On Workshop
14h00 14h30	CEUS Hands-On Workshop
15h30 16h00	CEUS Hands-On Workshop
16h15 16h45	CEUS Hands-On Workshop
17h00 17h30	CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

ANNUAL MEETING

FRIDAY, JUNE 9 - PACIFIC HALL

- 09h00 | 10h40** **CHILED ABUSE TF: KEEPING AN OPEN MIND**
Chairs: Amaka C Offiah
Introduction. Amaka C Offiah
09h00 Introduction. Amaka C Offiah
09h02 TEN-4-FACEsp: A mnemonic not to forget. Michelle Nagtegaal
09h20 Alternative diagnoses: what else besides abusive fractures? Annmarie Jeanes
09h38 Alternative diagnoses: What else besides AHT? Kshitij Mankad
09h56 Bayes in child abuse. Michelle Nagtegaal
10h14 East meets West: Differences between Eastern and Western Europe?
Panel discussion. Amaka C Offiah, Maria Raissaki, Damjana Ključevšek, Irmina Sefić, Goran Roić, Jovan Lovrenski
Closing Remarks. Amaka C Offiah
- 10h27**
- 10h30** **COFFEE BREAK**
- 11h00 | 12h30** **VOIDING DYSFUNCTIONS**
Chairs: Damjana Ključevšek, Erich Sorantin
11h00 Classification, pathogenesis and clinical approach to voiding dysfunctions, urinary incontinence and enuresis in children. Andrea Roić
11h27 The role of ultrasonography techniques in children with voiding disfunction. Damjana Ključevšek
11h54 Non-ultrasound imaging methods in voiding dysfunctions. Erich Sorantin
12h21 Discussion
- 12h30** **LUNCH**
- 13h30 | 15h00** **MEDICO-LEGAL CHALLENGES IN PAEDIATRIC RADIOLOGY - WHAT DO I NEED TO KNOW**
Chairs: Joanna Kasznia-Brown, Rick R. Van Rijn
13h30 Most common diagnostic errors in paediatric radiology. Rick R. van Rijn
13h50 Medico-legal aspects of radiological reports in suspected child abuse. Amaka Offiah
14h10 When you are called to the court. Owen Arthurs
14h30 Perspective from the judge. Wilma Duijst
14h50 Discussion
- 15h00** **COFFEE BREAK**
- 15h30 | 17h00** **ABDOMINAL TF**
Chairs: Lil-Sofie Ording Muller, Philippe Petit
15h30 Imaging in steatosis, current practice and knowledge. Seema Toso
15h55 Discussion
16h00 Basic elastography and its clinical applications. Jochen Herrmann, Martijn Verhagen
16h25 Discussion
16h30 Around the world of intussusception. Giulia Perucca
16h55 Discussion
- 17h00** **CLOSING CEREMONY**

FRIDAY, JUNE 9 - ATLANTIC HALL

- 09h00 | 10h40** **SCIENTIFIC SESSION: GI and GU**
Chairs: Giulia Perucca, Seema Toso
09h00 Plenary lecture: Paediatric MR lymphangiography. Jordan Rapp
09h25 Shear wave elastography and shear wave dispersion correlated to biopsy in scheduled follow-up of paediatric liver grafts. Ivan Cetinic
09h31 Liver MR and US elastography correlation to 4D flow and lymphatic stasis in paediatric Fontan Circulation. Charlotte de Lange
09h37 Liver shear wave elastography and portal venous doppler estimation before and after meal in paediatric patients with diffuse liver disease. Tijana Radović
09h43 Quantified Motility MR Enterography Response Assessment in Paediatric Inflammatory Bowel Disease. Riwa Meshaka
09h49 Hepato-renal index on ultrasound in overweight children as non-invasive quantitative imaging Biomarker. Virginie Frings
09h55 Ultrasound shear-wave elastography and attenuation imaging compared to histology in paediatric patients. Michael Zellner
10h01 Is ASL MRI the new tool for reliable renal perfusion quantification? Study of quality and reliability of repeated measurements. Tijana Radović
10h07 Ovarian Torsion: Challenges in Sonographic-Surgical discordance. Anna Seehofnerova
10h13 Antibiotic Prophylaxis for Micturating Cystourethrography: Findings from a National Multidisciplinary Survey. Harsimran Laidlow-Singh

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

- 10h19 Comparison of superb microvascular imaging with Color and Power Doppler imaging in the evaluation of testicular vascularity with Doppler Ultrasound for determination of viability in undescended testes in children. [Mustafa Faraşat](#)
- 10h25 An optimised diagnostic imaging pathway for suspected renovascular hypertension in children. [Rita Pina Prata](#)
- 10h31 Discussion
- 10h40 **COFFEE BREAK**
- 11h00 | 12h30 **MUSCULOSKELETAL TF**
Chairs: [Karen Rosendahl](#), [Laura Tanturri de Horatio](#)
- 11h00 Introduction. [Karen Rosendahl](#)
- 11h05 Ultrasound of the joints in children; MSK TF recommendations on techniques and Measurements. [Céline Habre](#)
- 11h25 Novel standards for knee ultrasound. [Silvia Costa Dias](#)
- 11h45 MRI and advanced imaging of the growth plate in the adolescent and young adult. [Ola Kvist](#)
- 12h15 Discussion
- 12h30 **LUNCH**
- 13h30 | 15h00 **SCIENTIFIC SESSION: MSK and AI**
Chairs: [Karen Rosendahl](#), [Susan Shelmerdine](#)
- 13h30 Plenary lecture: Imaging Musculoskeletal Manifestations of Paediatric Hematologic Malignancies. [Karen Rosendahl](#)
- 13h55 Role of T2-weighted MR radiomics in the prediction of FOXO1 fusion-positive rhabdomyosarcoma. [Adarsh Ghosh](#)
- 14h01 Paediatric bone age estimation from lateral elbow radiographs using a machine learning-mediated approach. [Alcide Alessandro Azzena](#)
- 14h07 Fully automated measurement of Cobb angle in coronal plane spine radiographs. [Christoph Salzlechner](#)
- 14h13 Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort. [Daniel Grafe](#)
- 14h19 An initial approach of Artificial intelligence in paediatric brain segmentation and quantification using Magnetic Resonance Imaging. [Dhananjaya Kotebagilu Narayana Vamyanmane](#)
- 14h25 Preferential involvement of the pelvis and hips along with active sacroiliitis in chronic nonbacterial osteomyelitis. [Ercan Ayaz](#)
- 14h31 Diagnostic performance of an artificial intelligence aid for the detection of paediatric appendicular skeletal fractures. [Irmhild Altmann-Schneider](#)
- 14h37 ZTE sequences with AI-based image reconstruction for 3D evaluation of the temporomandibular joint and craniofacial bones in children with juvenile idiopathic arthritis. [Nadja Kocher](#)
- 14h43 Artificial intelligence-based image reconstruction of abdominal MRI in children. [Vanda Pocepcova](#)
- 14h49 Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DW-MRI) in tumoral and Non-tumoral paediatric Bone Marrow Diseases (BMD). [Tatiana Fazecas](#)
- 14h55 Discussion
- 15h00 **COFFEE BREAK**
- 15h30 | 17h00 **POST MORTEM TF**
Chair: [Owen Arthurs](#)
- 15h30 Introduction. [Owen Arthurs](#)
- 15h35 Post mortem imaging - how to get started. [Aurelie D'hondt](#)
- 16h00 Post mortem CT - how to report. [Rick R. van Rijn](#)
- 16h25 How do I pay for post mortem imaging? [Owen Arthurs](#)
- 16h50 Discussion
- 17h00 **END OF SESSION**

FRIDAY, JUNE 9 - MEDITERRANEAN/ADRIATIC HALL

- 09h00 | 09h30 CEUS Hands-On Workshop
- 10h00 | 10h30 CEUS Hands-On Workshop
- 11h00 | 11h30 CEUS Hands-On Workshop
- 14h00 | 14h30 CEUS Hands-On Workshop
- 15h30 | 16h00 CEUS Hands-On Workshop
- 16h15 | 16h45 CEUS Hands-On Workshop

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



INDUSTRY SIMPOSIA - GOLD

WEDNESDAY, JUNE 7



12H30 | 12H50 - HALL 2

“Little super heroes deserve super powers- what MRI can offer for pediatric patients”

INDUSTRY LECTURE - BRONZE

WEDNESDAY, JUNE 7



19H10 | 19H20 - HALL 1

Promotional video - Role of Tesla and Pupin inventions on the development of radiology over the last century

INDUSTRY LECTURE - SILVER

THURSDAY, JUNE 8



10H30 | 10H40 - HALL 1

Alexandre PARPALEIX - AI in MSK : innovations in pediatric Imaging from MILVUE

INDUSTRY SYMPOSIA - GOLD

THURSDAY, JUNE 8



12H30 | 12H50 - HALL 2

Zelimir Antonić, radiologist - Benefits of spectral detector based CT

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



INDUSTRY LECTURE - SILVER

THURSDAY, JUNE 8

mindray

healthcare within reach

15H00 | 15H10 - HALL 1

Niccolo Parri - Why, What and How? An exploration of the potentials and why the time is right for paediatric PoCUS in Emergency medicine

13H10 | 13H30 - HALL 3

WS - Mindray introduction
The Radiology solution on Pediatrics by Resona R9

INDUSTRY SIMPOSIA - GOLD

THURSDAY, JUNE 8



17H00 | 17H30 - HALL 1

Dr Paulina Chodnicka, Children's Memorial Warsaw, Poland - MR imaging in liver cancer
TBA - Photon Counting CT

INDUSTRY LECTURE - BRONZE

FRIDAY, JUNE 9



10H40 | 11H00 - HALL 1

Daniel Grafe - Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort
Cristoph Salzlechner - Fully automated measurement of Cobb angle in coronal plane spine radiographs

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



**CROWN PLAZA HOTEL
CONFERENCE CENTER - MEZANINE
CONFERENCE HALLS & EXHIBITION AREA LAYOUT**



BELGRADE, SERBIA / Crowne Plaza Hotel **05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



ESPR
European Society of
Paediatric Radiology

E-ABSTRACT BOOK

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Scientific Oral Abstracts

Wednesday 7th 15.30h–17h

Neuroradiology and Fetal Imaging Session

MRI and Neurosonogram correlation of paediatric brain with dystocia

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Balakrishna P Shetty², Karthik Hegde³

1. Sri Devraj Urs Academy of Higher Education and Research Tamaka, Kolar, Karnataka 563103, India
2. Siddartha Academy of Higher Education Tumakuru, karnataka, India
3. Focus diagnostics and research center Bengaluru, Karnataka, India

Objectives: Evaluation of all the paediatric brain conditions related to dystocia with MRI and Neurosonogram. Correlation of complementary findings in early neonatal period. Assessment and evaluation of prognostic response in each conditions

Methods and Materials: Paediatric brain MRI evaluation in all suspected cases of dystocia. Over 40 cases were studied with MRI and followed by Neurosonogram correlation. Both findings were evaluated separately and followed up for prognosis. Conditions related to birth trauma are assessed and tabulated as superficial and deep injuries. Standard MRI sequences are used along with 3D high resolution sequence. Followed by Neurosonogram using high and low frequency probes.

Results: There are a wide range of conditions related to birth trauma, ranging from superficial and minor injuries through to fatal injuries. Most common superficial injuries were cephalohematoma and Caput succedaneum. Fracture skull was not so common. Periventricular leukomalacia, parenchymal hemorrhage, subdural and extradural hemorrhage were seen and follow-up. Germinal matrix hemorrhage and intraventricular extension. Hypoxic ischemia is most common deep injuries.

Conclusion: MRI evaluation of neonatal brain with dystocia gives you sufficient information related to brain injuries. Neurosonogram is adjuvant technique helps in confirming the MRI findings and also helps in identify new lesions undetected in MRI. Neurosonogram being a dynamic study helps in identifying inconspicuous findings which are not detected in standard MRI sequences.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

An easy applicable brain myelin quantification method

Efstratios Karavasilis¹, Chrisovalantis Stylianou², Marilena Chatzaki², Vasiliki Varlami³, Karafyllia Tziagkana², Savas Deftereos^{1,2}

1. Medical School, Democritus University of Thrace, Alexandroupolis, Greece
2. Department of Radiology, University General Hospital of Alexandroupolis, Alexandroupolis, Greece
3. Premature Neonate Unit, University General Hospital of Alexandroupolis, Alexandroupolis, Greece

Background: Brain myelination is crucial for normal brain function and it is frequently estimated as an brain development index in premature infants. There is an increased interest in the development of advanced imaging techniques and quantitative measures to assess the myelination progress which are not available or easy applicable at the most of the clinical MRI scanners. In our study, we developed an easy quantitative method to evaluate the brain myelination using the conventional MRI techniques.

Material and Methods: Thirty normal premature infants without neurological deficits were performed brain MRI exams in a 1.5T MRI system using the same examination routine protocol encompassing T2 turbo spin echo weighted and diffusion weighted images. Two raters had drawn ROIs in twelve anatomical brain regions including bilateral thalamus, frontal and parietal regions on T2 weighted images and on Apparent Diffusion Coefficient (ADC) maps. Data had high inter-rater agreement. A linear regression model was applied to identify correlation between the T2 and ADC ROIs' derived values and the corrected gestation age using SPSS.

Results: We found statistically significant linear correlations between T2 signal values and the corrected gestation age and also between ADC values and gestation age at $p < 0.05$. There were also derived the equations and the diagrams that depict their associations.

Conclusions: We demonstrate a non-sophisticated quantitative method to create a MRI system-specific normal diagrams from conventional imaging techniques in order to identify the normal and abnormal brain myelination in premature infants. Our method has to be evaluated in different scanners and in larger databases.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Cerebral Blood Flow Patterns in Preterm and Term Neonates Assessed with Pseudo-Continuous Arterial Spin Labeling Perfusion MRI

Eleonora Piccirilli¹, Antonello Chiarelli¹, Carlo Sestieri¹, Daniele Mascali¹, Darien Calvo Garcia¹, Richard G. Wise¹, Antonio Ferretti¹, Massimo Caulo¹

1. Department of Neuroscience, Imaging and Clinical Sciences, University of Chieti, Chieti, Italy

Background and Purpose: In preterm newborns, perfusion disturbances may predispose to abnormal brain maturation even without overt brain injury, highlighting the potential role of CBF as a biomarker of brain developmental dysfunction. We evaluated modifications of CBF patterns assessed with pCASL in preterm (PT) and full-term (FT) infants using a data-driven model.

Materials and Methods: Around term, 82 PT (<37 weeks GA at birth, GAB) and 55 FT (>37 weeks GAB) without major neonatal morbidity prospectively underwent the same standardized protocol on a 3T, including a pCASL. PT were screened for prematurity-related brain injury (GMH and PVL). PT were stratified into those without (PTH, further divided in: Early PT, PTHE: <28 weeks; Moderate PT, PTHM: 29-32 weeks; Late PT, PTHL: 33-36 weeks) and with prematurity-related brain injury (PTPVL and PTGMH). Grey matter CBF (CBFGM) was extracted from 90 ROIs of the UNC Infant Atlas and normalized through z-scoring (computing nCBFGM, expressed in units of SD from global CBFGM). ROIs were then combined using hierarchical clustering (HC). One-way ANOVAs were run to assess differences in nCBFGM within the clusters as a function of prematurity and prematurity-related brain injuries. Pearson's correlation was used to evaluate the relationship between GAB and nCBFGM.

Results: HC identified 4 main clusters of ROIs: Fronto-Temporal, Parieto-Occipital, Insular-Deep Grey Matter and SensoriMotor. SensoriMotor and Insulat-DGM had the highest CBF (13.2 and 11.9 ml/100g/min), while Parieto-Occipital and Fronto-Temporal were the least perfused (10.2 and 8.5 ml/100g/min). nCBFGM was above 0 in SensoriMotor and Insular-DMG (.94 and .48; $p < 10^{-4}$), and below 0 in Fronto-Temporal (-.78; $p < 10^{-4}$). In Fronto-Temporal, nCBFGM was higher in FT compared to all PTH subgroups ($p < .05$), with a positive

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



association between nCBFGM and GAB ($r=.37$; $p<.01$), and higher in PTPVL compared to PTH ($p<.05$). In SensoriMotor, nCBFGM was lower in FT compared to all PTH subgroups ($p<10^{-3}$) and negatively associated with GAB ($r=.42$, $p<10^{-3}$). In Insular-DMG, nCBFGM was higher in PTH compared to PTPVL ($p<.05$) and PTGMH ($p<0.1$).

Conclusions: CBF around term distributes heterogeneously in full-term and preterm infants and is differentially affected by prematurity and prematurity-related brain injury, suggesting different metabolic demands and developmental trajectories.

Isolated hypogonadotropic hypogonadism in adolescence: Do we need to measure pituitary gland? A retrospective MRI study

Ercan Ayaz^{1,2}, Ruken Yildirim^{1,2}, Canan Celebi^{1,2}, Sercan Ozalkak^{1,2}

1. Department of Radiology, Diyarbakir Children's Hospital, Diyarbakir – TR

2. Department of Pediatric Endocrinology, Diyarbakir Children's Hospital, Diyarbakir - TR

Background: Rapid changes in the size of the pituitary gland occur during the pubertal period. Therefore, measuring and reporting magnetic resonance imaging (MRI) in adolescents with pituitary disorders can cause unease among radiologists. Our aim was to compare the size of the pituitary gland, stalk and other previously described imaging tools in patients with isolated hypogonadotropic hypogonadism (HH) versus adolescents with a normal pituitary gland.

Methods: Forty-one patients (22 female, 19 male, mean age 16.3 ± 2.0 years, range between 12.8 and 21.1 years) with HH who underwent MRI prior to starting hormone treatment were enrolled. Age, sex, and genetic mutations (if available) were noted. Pituitary height, width on the coronal plane, anteroposterior (AP) diameter on the sagittal plane, stalk thickness, pons ratio (PR), clivus canal angle (CCA) and Klaus index (KI) were measured by two radiologists twice with a one-month interval blinded to each other and patient information. Measurements were compared with the control group, including 83 subjects with normal hypothalamic-pituitary-gonadal axis and normal pituitary gland on MRI. Inter-rater and intra-rater agreements were also evaluated with the intraclass correlation coefficient.

Results: No significant differences were found between the two groups regarding height, width or AP diameter ($p = 0.437, 0.836, 0.681$ respectively). No significant differences were found

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE

between the two groups regarding CCA and PR ($p = 0.890, 0.412$ respectively). The KI of the male patients was significantly higher than that of the female patients and the control group ($p < 0.001$). Four patients (9.76%) in the patient group had an organic lesion on pituitary MRI; three of those were Rathke cleft cysts (pars intermedia cysts), and one lesion was a partial empty sella. The interrater agreement was moderate for pituitary height and width, poor for pituitary AP diameter and stalk thickness, good for PR and KI, and excellent for CCA.

Conclusions: The measurements of the pituitary gland, stalk and posterior fossa structures were similar in adolescents with or without isolated HH. Therefore, only evaluating structural abnormalities and lesions seems to be sufficient in these patients and measurements are unnecessary when evaluating normal appearing pituitary gland on MRI.

Intraoperative MRI assessment of the tissue damage during laser ablation of Hypothalamic Hamartoma

Felice D'Arco¹, Sophie Lombardi¹, Domenico Tortora¹, Stefania Picariello¹, Sniya Sudhakar¹, Alessandro Consales¹, Enrico De Vita¹, Lino Nobili¹, Martin Tisdall¹

1. Great Ormond Street Hospital for Children Gaslini Children's Hospital - Genova -Italy

Background: Laser ablation for treatment of hypothalamic hamartoma (HH) is a minimally invasive and effective technique used to destroy hamartomatous tissue and disconnect it from the functioning brain. Currently, the gold standard to evaluate the amount of tissue being “burned” is the use of heat maps during the ablation procedure. However, these maps have low spatial resolution and there are no data correlating them with the effective tissue destruction on follow-up imaging. The aim of this study is to use different MRI sequences immediately after each laser ablation, and correlate the extensions of signal changes with the volume of malacic changes in a long term follow-up scan.

Material and methods: During the laser ablation procedure we imaged the hypothalamic region with high resolution axial diffusion weighted images (DWI) and T2 weighted image (WI) after each ablation. At the end of the procedure we also added a post-contrast T1WI on the same region.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

We then correlated the product of the maximum diameters on axial showing signal changes (acute oedema on T2WI, DWI restriction rim, DWI hypointense core and post-contrast T1WI rim) with the product of the maximum diameters on axial of the malacic changes (on T2 WI) in the follow-up scan, both as a fraction of the total area of the hamartoma.

Results: The area of the hypointense core on DWI acquired immediately after the laser ablation statistically better correlated with the final area of encephalomalacia while T2WI, hyperintense DWI rim and T1WI rim of enhancement tend to overestimate the actual damage and may bias the decision-making during the ablation, stopping the procedure before enough damage has been done.

Conclusions: The use of intraoperative sequences (in particular DWI) during laser ablation, can give to the surgeons valuable information in real-time about the affecting damage on the hamartomatous tissue, with better spatial resolution in comparison to the thermal maps.

Do children with suspected inflicted skull fractures really need an MRI?

Dr. Harriet Edwards¹, Dr. Caren Landes¹

1. Alder Hey Children's Hospital, Liverpool, UK

Background: The Royal College of Radiologists (RCR) published updated joint guidelines for suspected physical injury in children in 2018. With regards to cross-sectional neuroimaging, it states that all skull fractures should be followed up with MRI imaging, however there is no reference to support this.

We audited all CT heads performed in children under 2 for both explained and unexplained injury at our tertiary children's hospital, to assess the management of skull fractures with and without intracranial pathology and assess whether we were following the current national guidelines.

Method: A CRIS database search was carried out to identify all CT heads performed over two years at our hospital with a clinical indication relating to suspected physical abuse or head trauma.

Clinical history, radiology report, further imaging and patient management was reviewed, including the time interval between scans for all patients with skull fractures.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Result: 174 patients were included from a search between September 2018 and November 2022. 102 patients had unexplained injuries requiring CT head and 22 of these fulfilled criteria for further MRI imaging. 72 head injuries that had a CT were considered to have explained mechanisms.

Of the unexplained injuries reaching criteria for MRI, 15 were isolated skull fractures and an MRI was recommended by the radiologist in one report. Two patients had fractures with underlying haemorrhage and five had intracranial haemorrhage only.

All patients with intracranial haemorrhage went on to have MRI, but only one of the 15 patients with isolated skull fractures had further MRI imaging. No patients had CT to follow-up fractures.

Conclusions: Patients with unexplained injuries and found to have a skull fracture on CT head are recommended by the RCR to have further MRI imaging. In our tertiary centre we found only one out of 15 patients followed guidelines and the MRI was normal. No further imaging or complications were found on review of all included patients with skull fractures.

We therefore propose that MRI brain imaging following isolated skull fracture in unexplained injury, which requires general anaesthetic or sedation, is not a necessary recommendation without firm evidence to suggest otherwise.

Frequency of Cerebellar-Thalamic Circuit Involvement in Term Hypoxic-Ischemic Injury and Relationship to MRI Pattern of Injury

Luis Octavio Tierradentro-Garcia, MD¹, Shyam Venkatakrishna, MD¹; Parth Sharma²; Cesar Augusto Alves¹, MD, PhD; Mohamed Elsingery, MD¹; Fikadu Worede, MD¹; Jelena Curic BA, MBA²; Savvas Andronikou, MD, PhD^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, USA.

2. Department of Radiology, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

Purpose: Specific brain imaging patterns are associated with timing, duration, and severity of insult in children with prior hypoxic-ischemic injury (HII). Cerebellar injury has not been adequately evaluated in term HII regarding known patterns of injury. We aimed to evaluate

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

associations between cerebellar-thalamic circuit injury and known magnetic resonance imaging (MRI) patterns of HII.

Materials and Methods: This retrospective, observational study included children aged 0-18 years with term HII as demonstrated on delayed MRI. A pediatric neuroradiologist evaluated the MRI patterns of injury and classified them into the following categories: 1) basal ganglia-thalamus (BGT), 2) watershed (WS), 3) combined (BGT/WS), and 4) multi-cystic. We determined the frequency of cerebellar involvement (T2/FLAIR as hyperintensity and/or atrophy of hemispheres and/or vermis). A researcher blinded to results on cerebellar involvement assessed the presence of thalamic injury in the following nuclear groups: 1) ventrolateral nuclei (VLN), 2) pulvinar, 3) anterior, and 4) medial. We evaluated the association of cerebellar injury with 1) each MRI pattern of injury and 2) the presence and location of intra-thalamic injury using chi-square.

Results: Of 1175 children (mean age 6 years) with term HII, 252 (21%) had cerebellar injury. The vermis was more commonly affected (n=209, 83%) than the cerebellar hemispheres (n=86, 34%); hemispheres and vermis were involved in 43 children (17%). Cerebellar injury was significantly associated with a combined BGT/WS pattern (p=0.03). Of the children with cerebellar injury, 226 (90%) had a concomitant thalamic injury, most commonly involving the VLN (n=97, 39%). Vermian injury was associated with VLN injury [OR 35.7 (95% CI 4.8-264.1), p<0.001]. Hemispheric injury was associated with injury in any other thalamic region [OR 3.3 (95% CI 1.9-5.7), p<0.001].

Conclusions: Cerebellar injury was frequently identified in children with HII on delayed MRI and mainly involved the vermis. Vermian injury was associated with thalamic injury in the VLN. These associations may be explained as occurring upstream or downstream along synaptic networks through post synaptic injury and/or Wallerian degeneration, depending on the type of insult. Further research, including prospective longitudinal studies assessing clinical outcomes, are needed to evaluate the clinical utility of these injury patterns.

Image Quality Transfer can improve the contrast and lesion characterisation in low-field MRI

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Matteo Figini^{1,2}, Hongxiang Lin^{1,2,3}, Felice D'Arco⁴, Godwin Ogbale⁵, Maria Camilla Rossi Espagnet⁶, Olalekan Ibukun Oyinloye⁷, Joseph Yaria⁸, Donald Amasike Nzeh⁷, Mojisola Omolola Atalabi⁹, Lisa Ronan^{1,2}, David W Carmichael^{10,11}, Judith Helen Cross^{11,12}, Ikeoluwa Lagunju¹³, Delmiro Fernandez-Reyes^{2,13}, and Daniel C Alexander^{1,2}

1. Centre for Medical Image Computing, University College London, London, United Kingdom
2. Computer Science, University College London, London, United Kingdom
3. Research Center for Healthcare Data Science, Zhejiang Lab, Hangzhou, China.
4. Radiology, Great Ormond Street Hospital for Children, London, United Kingdom
5. Radiology, College of Medicine, University of Ibadan, Ibadan, Nigeria
6. Neuroradiology, Sapienza University, Rome, Italy
7. Radiology, University of Ilorin Teaching Hospital, Ilorin, Nigeria
8. Neurology, University College Hospital Ibadan, Ibadan, Nigeria
9. Radiology, University College Hospital Ibadan, Ibadan, Nigeria
10. School of Biomedical Engineering & Imaging Sciences, King's College London, London, United Kingdom
11. Great Ormond Street Institute of Child Health, London, United Kingdom
12. Great Ormond Street Hospital for Children, London, United Kingdom
13. Paediatrics, College of Medicine, University of Ibadan, Ibadan, Nigeria

Introduction: Low-field (LF, < 1T) Magnetic Resonance Imaging (MRI) is common in lower- and middle-income countries due to its easier and cheaper management. Images are often acquired at lower spatial resolution than at high field to partially overcome the inherently lower signal-to-noise ratio (SNR), which significantly limits the diagnostic power of LF-MRI.

Image Quality Transfer (IQT) is a machine learning framework to enhance the quality of images based on high-quality references. We have recently adapted it to improve the contrast and resolution of LF-MRI. Here we report the results of a preliminary radiological evaluation of the diagnostic quality of IQT-enhanced images in paediatric patients with epilepsy.

Methods: Twelve paediatric patients with intractable epilepsy (5 to 18 years old) had axial FLAIR, T1-weighted and T2-weighted MRI scans with an in-plane resolution of 0.5 mm and a slice thickness of 5 mm, both on a 0.36T MRI scanner and on a 1.5T scanner. The IQT model (Lin *et al.*, MICCAI 2019) was applied to the LF images to obtain IQT-enhanced images. The

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

three sets of images (LF, HF and IQT-enhanced) were anonymised and randomly assigned to 6 reviewers, who evaluated the differentiation between normal-appearing grey and white matter (GM-WM) and lesion characterisation with scores from 1 to 4.

Results: IQT improved the contrast between healthy brain tissues and the appearance in non-axial planes of LF images. Most lesions also became more clearly visible in IQT-enhanced images compared to the raw LF images.

Reviewers scored both GM-WM differentiation and lesion characterisation in IQT-enhanced images as intermediate between LF and HF, except for GM-WM differentiation on FLAIR that was worse than at LF. Four of the reviewers, with experience in general radiology at LF, tended to give higher scores to LF images and lower scores to IQT-enhanced images than the other two reviewers, who have specialist expertise in paediatric neuroimaging at HF.

Conclusions: Our IQT algorithm can improve the contrast between tissues and lesion visibility on LF-MRI. If these preliminary results are confirmed, IQT can be an important tool to help boost the diagnostic power of LF-MRI.

Is there a difference in subcortical volume in children with non-lesion and lesion epilepsy?

Zorica Joković¹, Aleksa Pejović², Vera Miler Jerković³, Marija Mijaljević⁴, Polina Pavićević¹, Aleksandar Ristić²

1. Department of Radiology, University Children's Hospital, Medical Faculty, Belgrade, Serbia

2. Epilepsy department, Clinic of Neurology, University Clinical Centre of Serbia, Medical Faculty, Belgrade, Serbia

3. Innovation Centre of the School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

4. Department of Radiology, Institute of Oncology and Radiology of Serbia, Medical Faculty, Belgrade, Serbia

*corresponding author dr.z.jokovic@gmail.com

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE

Background: Many studies have found the difference in subcortical grey matter (GM) in patients with epilepsy, but there are a few studies that have compared subcortical GM between patients with temporal lobe epilepsy in children. We evaluated subcortical GM from patients with lesions and non-lesion magnetic resonance imaging (MRI). T1-weighted MR images of the human brain are used for segmentation. Our aims were to determine whether there are structural abnormalities in these patients and to correlate with the clinical characteristics of the disease.

Methods: High-resolution T1 weighted structural scans were acquired in the sagittal plane at 1.5 T (Philips Achieva, Amsterdam, Netherlands), and 1.5 T (Siemens, Avanto/Aera, Erlangen, Germany). Volumetric data for six subcortical GM structures (caudate nucleus, putamen, globus pallidus, nucleus accumbens, thalamus, and amygdala) were obtained using an atlas-based segmentation and registration tool. We used, an automated, model-based approach the FMRIB Integrated Registration and Segmentation Tool (FIRST), which is provided as a part of the FSL software library for calculating a raw volume of subcortical GM. Differences in the volumes between these two groups with epilepsy correlate with cognitive impairment.

Materials: The participants in our study include children with epilepsy; half were with non-lesion MRI and the other half with lesions. Twelve children with lesion epilepsy and 12 age-matched with non-lesion were imaged with high-resolution structural MR scans, from individuals aged 13-19 years. In the non-lesion MRI group were 4 boys (33.3%; mean age 15.2 ± 1.4), while in the group with lesion MRI were 5 boys (41.7%; mean age 16.1 ± 2.2). In the lesion MRI group, 7 have hippocampal sclerosis, 2 have dysembryoplastic neuroepithelial tumors, and one has focal cortical dysplasia.

Results: We found a statistically significant difference ($p < 0.004$, Mann-Whitney test) between non-lesion MRI epilepsy and lesion MRI at the right pallidum ($p = 0.009$; 1574.713 ± 189.699 vs. 1819.228 ± 228.227). There were no significant differences at the thalamus, nucleus caudate, putamen, amygdala, and accumbens area.

Conclusions: This study shows that there are differences in pallidum volume, which is the brain's main function mechanism of reward and motivation, and the results may explain low psychosocial outcomes. Subcortical GM atrophy is relevant to the early onset and progression of epilepsy.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Contributions of Adding a Routine Mastoid Fontanel Approach to Anterior Transfontanel Evaluation in the Newborn

Sevinç Taşar¹, Funda Yavanoğlu Atay

1. Ege University

Background: We aimed to share the results by adding mastoid fontanel kranial US (MF-CUS) method, which has so many benefits, to routine transfontanel examinations in our neonatal intensive care unit.

Material Methods: A total of 2400 newborn patients with a gestational age of 28_40 weeks who were hospitalized in the neonatal intensive care unit of our hospital between January 2020 and January 2023 were included in the study. In all patients, US was performed from the anterior fontanelle and the results were recorded. Then, sonographic evaluation of the mastoid fontanelle was performed blindly. Control MRI was performed in some patients. Thus, the contribution of the mastoid fontanelle to the diagnosis was evaluated.

Results: The posterior fossa cannot be evaluated adequately in the evaluations made only from the anterior fontanelle. Especially in term babies, probe insufficiency becomes more evident since the area to be examined is larger and fontanelle is narrower compared to premature babies. There were 48 patients who could not be detected only when viewed from the anterior fontanel and pathology was detected when the mastoid fontanel was added to the examination. Dilatation and hemorrhagic material in the lateral ventricular occipital horn in 15 of them, cerebellar hematoma in 13, isolated cerebellar vermis hypoplasia in 10, cerebellopontine hypoplasia in 3, transverse sinus thrombosis in 2, intraventricular hemorrhage in 2 of them, cerebellar hemispheric hypoplasia in 1, Dandy Walker malformation was detected in one of them and subdural collection in one of them.

Discussion: MF-CUS is an important window for the evaluation of the posterior fossa and partially occipital lobes and occipital horns of the lateral ventricle. It is useful in detecting congenital anomalies as well as acute findings such as bleeding, hematoma, sinus vein thrombosis, subdural collections. It is performed at the bedside and provides immediate diagnostic information. MRI provides diagnosis before imaging is possible. For an experienced sonographer requires only a few minutes of additional scanning time. However, MF-CUS also

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



has its limitations. smaller lesions may be overlooked and false positive diagnoses may occur. Therefore, additional MRI is required in newborns with suspected PF abnormalities.

Conclusion: In all transfontanel examinations, in addition to the anterior fontanel, the mastoid fontanel should be routinely included in the examination.

Thursday 8th 9h-10:30h

Cardiothoracic and CT Session

Late chest wall sequelae after neonatal corrective surgery for esophageal atresia: a real-time MRI study

Gräfe, Daniel¹, Franz-Wolfgang Hirsch¹, Steffi Mayer², Martin Lacher², Ophelia Aubert²

1. Department of Pediatric Radiology, University Hospital, Leipzig, Germany

2. Department of Pediatric Surgery, University Hospital, Leipzig, Germany

Background: Musculoskeletal deformities and pulmonary morbidity are common in children after esophageal atresia (EA) repair. This study aims to assess morphological and functional postoperative changes after open or minimally invasive (MIS) approach compared to healthy controls by thoracic real-time MRI. This novel technique provides ultrafast, high-quality images during spontaneous breathing, without sedation even in young children.

Materials and Methods: Children aged 3-18 years were prospectively examined with real-time MRI at 3T. Musculoskeletal deformities, thoracic motility, and static thoracic cross-sectional areas (CSA) at three different levels, as well as dynamic right-to-left ratio of CSA of hemithoraces during deep breathing were evaluated.

Results: 72 children (41 open, 8 MIS, 23 controls) were recruited. Mean age at examination was lower in MIS (6.8±2.8) than open (10.4±4.0) and control (10.8±3.5) patients (p<0.05). In the EA group, rib fusions (76%) and scoliosis (15%) were found after thoracotomy, but not after MIS. Mean right-to-left ratio of CSA were lower after thoracotomy compared to MIS and controls (p<0.05), indicating decreased thoracic motility and impaired thorax development. This was significantly aggravated by an increasing number of thoracotomies. Mean right-to-left ratio of CSA in MIS patients did not differ from controls.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusions: For the first time, morphological changes and thoracic motility after EA repair were visualized by dynamic real-time MRI. Children after open repair showed more musculoskeletal deformities, decreased right-sided thoracic motility and development compared to MIS and controls. Our study emphasizes that the musculoskeletal morbidity following a thoracotomy in infancy is high.

The usefulness of lung ultrasound in newborns and infants with respiratory pathologies

Stoicescu Emil Robert¹, Iacob Roxana¹, Cerbu Simona¹, Manolescu Diana¹, Birsasteanu Florin¹

1. Department of Radiology and Medical Imaging, 'Victor Babes' University of Medicine and Pharmacy Timisoara, Eftimie Murgu Square No. 2, 300041 Timisoara, Romania, Research Center for Pharmaco-Toxicological Evaluations, 'Victor Babes' University of Medicine and Pharmacy Timisoara, Eftimie Murgu Square No. 2, 300041 Timisoara, Romania

Background: Today, lung ultrasound is a useful tool used as a non-invasive, radiation-free method to investigate respiratory pathologies, particularly in newborns and children.

Purpose: This study aims to demonstrate this method's effectiveness in managing respiratory diseases of neonates and infants, avoiding cumulative doses of radiation.

Material and Methods: The study included 42 newborns and infants with respiratory diseases, 31 of whom were infected with SARS-CoV2. The ultrasound machines used for the assessment were equipped with both the linear transducer and the micro convex one. For all neonates and infants, lung severity was assessed with an ultrasound score covering twelve chest areas of interest – Lung UltraSound Score (LUSS).

Results: The most common ultrasound changes indicate the disappearance of the physiological A-lines in 90.47% of cases, sparse B-lines in 61.90%, and coalescent B lines with a prevalence of 38.09%. The abnormalities of the pleural lines (thickening, fragmentation, irregularity) were found in 59.52%, and subpleural consolidations at 28.57%. The correlation between LUSS and the patient's symptoms and biomarkers was conducted with the Pearson correlation coefficient, showing $r = 0.814$ ($p = 0.03$) between the LUSS and IL-6 levels at symptomatic neonates and infants (with fever and cough).

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Conclusions: The changes revealed by the lung ultrasound and assigned LUSS show a mild form of respiratory pathology in neonates and infants. Thoracic ultrasound may be used in the follow-up of patients with respiratory pathology, assisting in the management of pulmonary pathologies of newborns, based on LUSS.

References:

1. Stoicescu, E.R.; Lovrenski, J.; Iacob, R.; Cerbu, S.; Iacob, D.; Iacob, E.R.; Susa, S.R.; Ciuca, I.M.; Ciornei-Hoffman, A.; Oancea, C.; Manolescu, D.L. COVID-19 in Infants and Children under 2 years – Lung Ultrasound Score Correlated with Biomarkers and Symptoms. Preprints 2022, 2022120036 (doi: 10.20944/preprints202212.0036.v1).
2. Stoicescu, E.R.; Ciuca, I.M.; Iacob, R.; Iacob, E.R.; Marc, M.S.; Birsasteanu, F.; Manolescu, D.L.; Iacob, D. Is Lung Ultrasound Helpful in COVID-19 Neonates?—A Systematic Review. *Diagnostics* 2021, 11, 2296. <https://doi.org/10.3390/diagnostics11122296>
3. Stoicescu, E.R.; Manolescu, D.L.; Iacob, R.; Cerbu, S.; Dima, M.; Iacob, E.R.; Ciuca, I.M.; Oancea, C.; Iacob, D. The Assessment of COVID-19 Pneumonia in Neonates: Observed by Lung Ultrasound Technique and Correlated with Biomarkers and Symptoms. *J. Clin. Med.* 2022, 11, 3555. <https://doi.org/10.3390/jcm11123555>

Stoicescu.emil@umft.ro

Dual Phase CTA evaluation of the Pulmonary Veins with Dual Energy and High-pitch ECG-Gated CTA

Jordan B. Rapp¹, Hansel J. Otero¹, Karen I. Ramirez¹, Ammie M. White¹, Mariangeles Medina Perez¹, Michael L. O’Byrne¹, Ryan Callahan¹, Jonathan J. Rome¹, David M. Biko¹

1. Children’s Hospital of Philadelphia

Background: Imaging plays an ever-increasing role in the evaluation of the pulmonary veins (PV). PV stenosis results from a variety of causes such as congenital heart disease (CHD) or chronic lung disease (CLD). We aim to demonstrate that dual-energy CT (DECT) can identify significant perfusion abnormalities related to PV stenosis.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Material and Methods: CTA of the chest of the PV was performed using a dual-phase technique. First, CTA using DECT with 2mg/kg of IV contrast timed for optimal evaluation of the pulmonary arteries was performed. Iodine concentration was measured in each lobe. Subsequently, high-pitch ECG-gated CTA using 1mg/kg of IV contrast timed for optimal visualizing of the PVs. Each of the four PVs were measured, when applicable. Presence of stenosis and decreased perfusion was compared between CTA phases and with cardiac catheterization. Patients with prior PV interventions and cavopulmonary connections were excluded.

Results: 20 patients (9 male) with a median age of 6 months (2 weeks to 11 years) were included. In terms of diagnosis, 30% had TAPVR, 55% had CLD, and 15% had other diagnoses. Eight (40%) had cardiac catheterization for PV evaluation. 11 (55%) patients had normal CT anatomic and perfusion evaluations. Six (30%) patients had concordant anatomic stenosis (11 veins) and perfusion abnormalities (18 lobes), all confirmed with catheterization. Discordance occurred in three cases, all with CLD. In one patient normal perfusion (3 lobes) underestimated PV stenosis (2 veins) on the anatomic scan. In one patient diminished perfusion (1) was seen without anatomic stenosis (1). One patient had a mixture of diminished perfusion (2) with corresponding anatomic stenosis (1) and diminished perfusion (3) with normal veins (2). In the two patients with catheterization, it matched the anatomic scan.

Conclusion: In our study there was concordance between CT anatomic evaluation of the pulmonary veins and cardiac catheterization. Most cases also demonstrated concordance with DECT perfusion maps. Abnormalities related to lung parenchyma in patients with moderate to severe CLD were a cause of non-concordance and must be considered when interpreting perfusion maps when evaluating for PV stenosis.

Phase resolved functional lung (PREFUL) MRI detects improvement of perfusion and ventilation after Elexacaftor/Tezacaftor/Ivacaftor therapy in patients with Cystic Fibrosis

Martha Dohna¹, Andreas Voskrebenez^{1,2}, Filip Klimes^{1,2}, Till F. Kaireit^{1,2}, Julian Glandorf^{1,2}, Sophia T. Pallenberg^{2,3}, Felix C. Ringshausen^{2,4,5}, Gesine Hansen^{2,3}, Diane Miriam Renz¹, Frank Wacker^{1,2}, Anna-Maria Dittrich^{2,3}, Jens Vogel-Claussen^{1,2,3}

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



1. Department of diagnostic and interventional Radiology, Hannover Medical School, Hannover, Germany
2. German Center for Lung Research (DZL), Biomedical Research in Endstage and Obstructive Lung Disease (BREATH), Hannover Medical School, Hannover, Germany
3. Department for Pediatric Pneumology, Allergology and Neonatology, Hannover Medical School, Hannover, Germany
4. Department of Respiratory Medicine, Hannover Medical School, Hannover, Germany
5. European Reference Network on Rare and Complex Respiratory Diseases (ERN-LUNG), Frankfurt, Germany

Background: There is a need for regional monitoring of treatment effects of elexacaftor/tezacaftor/ivacaftor (ETI) in people with cystic fibrosis (pwCF).

Purpose: To investigate if phase-resolved functional (PREFUL) magnetic resonance imaging (MRI) derived quantitative ventilation and perfusion measures can assess changes in pwCF after initiation of ETI therapy and how these measures relate to established clinical and MRI-derived parameters.

Materials and methods: Participants with CF aged ≥ 12 years underwent PREFUL MRI, spirometry, sweat chloride test, anthropometry and lung clearance index (LCI) assessment before and 8-16 weeks after ETI. 2D dynamic coronal gradient echo images covering the entire lung were acquired. For PREFUL derived ventilation and perfusion parameter extraction MR images were evaluated by an automated quantitative pipeline. In addition, the semiquantitative Eichinger score was derived by radiologist read using T1 and T2 weighted MR images as well as PREFUL perfusion maps.

Results: 23 participants (13 female, median age 18 years (IQR, 14-24.5) received MRI assessment before and after initiation of ETI. Quantitative PREFUL parameters of ventilation and perfusion, visually assessed Eichinger score and clinical parameters showed significant improvement after treatment with ETI. Ventilation defect percentage of regional ventilation decreased from 18% (IQR, 14-25) to 9% (IQR, 6-17) ($P=0.003$), and perfusion defect percentage from 26% (IQR, 18-36) to 19% (IQR, 13-24) ($P=0.002$). Areas of matching normal (healthy) ventilation and normal perfusion increased from 52% (IQR, 47-68) to 73% (IQR, 61-83). Absolute change of post-treatment flow volume loop (FVLCM) correlated with LCI

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



changes ($P=0.032$). Visually assessed perfusion score did not correlate with PREFUL perfusion ($P=0.11$) nor with ventilation/perfusion match values ($P=0.375$).

Conclusion: Automated quantitative PREFUL MRI supports previous data showing structural improvements in MRI in pwCF in response to ETI. Furthermore, our data provide evidence, that this novel technique also identifies perfusion and ventilation changes in response to CFTR modulator therapy with elexacaftor/tezacaftor/ivacaftor.

UTE/ZTE lung-MRI in the diagnosis of tracheobronchial stenosis in children

N. Kocher¹, W. Jungraithmayr^{2,3}, M. Zellner¹, T. Schürmann⁴, A. Möller⁴, C. Kellenberger¹

1. University Children's Hospital Zurich - Eleonore Foundation, Department of Diagnostic Imaging, Zurich, Switzerland

2. Department of Thoracic Surgery, University Hospital Zurich, Zurich, Switzerland

3. Department of Thoracic Surgery, Medical Center – University of Freiburg, Faculty of Medicine, University of Freiburg, Germany

3 University Children's Hospital Zurich - Eleonore Foundation, Department of Pulmonology, Zurich, Switzerland

Purpose: Tracheobronchial stenosis in pediatric patients is diagnosed by bronchoscopy in combination with CT. Visualization of the tracheobronchial system with traditional MRI sequences is only possible to a limited extent. By using novel MRI sequences with very low echo times, airfilled structures can be imaged sufficiently. The aim of this study was to evaluate the diagnostic performance and reproducibility of ultrashort (UTE) and zero echo time (ZTE) sequences in children with tracheobronchial stenosis.

Methods: Lung-MRI studies performed between 10/2018 and 03/2023 at a 1.5T GE Signa Scanner in a single-center were retrospectively evaluated. UTE/ZTE sequences of patients with stenosis of the tracheobronchial system, confirmed by bronchoscopy, and healthy controls were assessed for their diagnostic accuracy. Furthermore, diameters of airways were measured independently by two radiologists on multiplanar reconstructions at the level of the stenosis, in the proximal trachea and in the right and left main bronchus. For five patients in the diseased

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

group and for eight patients in the healthy control group, quantified diameters of the MRI data were compared to those of the CT data.

Materials: 23 patients with a mean age of 27.8 months (0-13 years) with a stenosis of the tracheobronchial system were included in the study. Five of these 23 patients also underwent a CT scan within five months prior to or after the MRI. Eight patients with a mean age of 63.8 months (0-13 years) without any stenosis of the tracheobronchial system that underwent an MRI as well as a CT scan within a time interval of 7 months, due to other thoracic pathologies, served as healthy controls.

Results: The two independent radiologists diagnosed the diseased group in both imaging modalities correctly. The differences of the measured diameters, plotted in a Bland-Altman diagram, scattered around zero, thus no consistent bias of MRI and CT can be suggested. A high inter-rater reliability was seen.

Conclusions: UTE and ZTE imaging of the tracheobronchial system represents a novel radiation-free method with a high diagnostic performance and reproducibility, which has the potential to replace CT scans in the pediatric population.

CT-Based Predictive Model for Myocardial Ischemia in Anomalous Aortic Origin of Coronary Artery

Rajesh Krishnamurthy¹, Silvana Molossi², Carlos Mery², Jayanthi Parthasarathy¹, Michael Jiang⁴, Tara Karamlou⁴, Lakshmi Prasad Dasi⁵

1. Nationwide Children's Hospital, The Ohio State University, Columbus, Ohio, USA
2. Texas Children's Hospital, Houston, Texas, USA
3. UT-Dell Children's Hospital, Austin, Texas, USA
4. Cleveland Clinic, Cleveland, Ohio, USA
5. Georgia Institute of Technology, Atlanta, Georgia, USA

Purpose: The cause of sudden cardiac death (SCD) in anomalous aortic origin of the coronary artery (AAOCA) has a biomechanical basis related to specific morphological features detectable by CT, including dynamic ostial stenosis and narrowing of the intramural and inter-arterial segments of the proximal coronary artery during exercise. However, decision making

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

for optimum management is limited by lack of a predictive model that determines risk for SCD. We present a novel reduced-order model that utilizes CT biomarkers as input; stress induced Instantaneous wave-free ratio (iFR) changes as output; and solves for dynamic pressure changes from the ostium through distal coronary artery, including dynamics of intima wall motion of the intramural segment.

Materials and Methods: This is an IRB approved feasibility study that collected cath-derived iFR at rest and after Dobutamine stress from 8 pediatric and adult patients with AAOCA (age range 11-63). Morphological characteristics of the proximal anomalous coronaries, such as ostial and proximal coronary caliber, intramural length, and intima wall thickness were extracted from CT. A Frank-Starling driven reduced order model that solves a zero-dimensional representation of the fluid-structure interaction of the intramural wall and the coronary artery coupled with blood flow was developed, and baseline state (determined by the fluid parameters of the model) tuned for each patient's corresponding resting Cath iFR. The model simulated and predicted iFR changes corresponding to Dobutamine stress by tuning material properties of the intima wall. Comparison of % predicted to measured iFR drop between rest and exercise was made in 6 patients.

Results: AAOCA predictive model was successfully tuned to patient-specific physiological flow conditions. Resting cath iFR range was 0.81 to 0.98 while stress iFR range was 0.72 to 0.95. Simulated iFR with stress was 0.7 to 0.94. Model demonstrated good agreement with predicted iFR drop with stress falling within 14% error of the measured cath-iFR drop.

Conclusion: Novel predictive model of ischemia in AAOCA using CT based morphologic imaging biomarkers in a patient-specific reduced-order approach captures dynamic changes in coronary pressure and iFR with stress. The next steps are further refinement of the model, and application in a validation study to distinguish AAOCA subjects with and without ischemia.

CONSERVATIVE VS. SURGICAL TREATMENT OF PARAPNEUMONIC EFFUSIONS IN CHILDREN - WHERE ARE THE ULTRASONOGRAPHIC BOUNDARIES?

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Svetlana Balj Barbir¹, Dragana Simić¹, Jelenković Aleksandar¹, Jecković Mihajlo¹, Gordana Vilotijević-Dautović^{1,2}, Snježana Ilić¹, Radoica Jokić^{1,2}, Jelena Antić^{1,2}, Bojana Andrejić-Višnjić², Jovan Lovrenski^{1,2}

1. Institute for Children and Adolescents Health Care of Vojvodina, Novi Sad, Serbia

2. Faculty of Medicine, University of Novi Sad, Serbia

Background: Incidence of parapneumonic effusion, the most common complication of pneumonia in children, has increased worldwide. Its treatment is controversial without a clear boundary between conservative and invasive approach.

Methods: A retrospective study of paediatric patients with parapneumonic effusion admitted at the University children's hospital within a 3-year period (2020-2022) was conducted. Groups of patients treated conservatively (antibiotics only) and surgically were compared, as well as subgroups of patients with simplex (anechoic) and complex effusions (echogenic or with fibrinous strands, septations, loculations).

Materials: Hospital databases were reviewed to determine treatment, laboratory, radiological investigations and hospital days. Ultrasonography (US) effusion thickness (maximum perpendicular interpleural distance between consolidated lung and the chest wall) was analyzed.

Results: A total of 47 children aged 1-17 years (4.9±3.8y) were enrolled in the study, 29 treated conservatively and 18 surgically (intercostal drainage in 13, 1 thoracentesis, 4 video-assisted thoracoscopic surgeries). Effusion thickness in surgical group was significantly higher ($p<0.001$) compared to conservative group (mean 36.33±18.65mm vs. 12.90±8.21mm), with effusion thickness ≥ 20 mm in 94.4% of patients. In conservative group effusions were <25 mm in 89.6% of patients. Total of 21 children had simple and 26 complex effusions. Patients with simple effusions did not require surgery, had significantly smaller effusion thickness (10.17±6.17mm vs. 31.33±17.88mm) and shorter hospital stay (15.2 vs. 29.8 days) compared to complex effusion subgroup. Patients with complex effusions had similar length of hospitalization regardless of treatment method. Surgically treated children all had complex effusions, significantly higher white blood counts and C-reactive protein values ($p<0,001$), and significantly longer hospital stay compared to conservative group (29.7 days (17-44) vs. 19.3 (5-46)). US effusion complexity ($p<0.001$) and thickness ($p<0.01$) were the strongest determining parameters.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Conclusions: US findings of complex parapneumonic effusions with a thickness over 20mm are strongly related with severity of the disease, therapeutic decisions and length of hospitalization. In our study effusion thickness of 20-25mm and 25-30mm were proved as borderline and highly indicative for surgical treatment respectively.

Congenital Variants and Anomalies of the Aortic Arch – single centre study

Vesna Topic¹, M. Stajevic^{2,3}, V. Vukomanovic^{2,4}, A. Gazikalovic⁵, S. Milinkovic¹, J. Toncev¹, D. Perkovic¹, N. Zlatac¹, S. Prijic^{2,4}, I. Dizdarevic³, S. Gazikalovic¹

1. Department of Radiology, Institute for Mother and Child Health Care of Serbia "Dr Vukan Cupic", Belgrade, Serbia
2. Medical School, University of Belgrade, Belgrade, Serbia
3. Department of Pediatric Cardiothoracic Surgery, Institute for Mother and Child Health care of Serbia "Dr Vukan Cupic", Belgrade, Serbia
4. Department of Cardiology, Institute for Mother and Child Health care of Serbia "Dr Vukan Cupic", Belgrade, Serbia
5. Department of Radiology, Ljubljana University Medical Centre, Slovenia

Objective: Congenital aortic arch malformations present a large spectrum of variations and anomalies, as a result of disordered embryogenesis of branchial arches.

Some of these variants are asymptomatic and frequently reported as incidental findings on imaging studies. However, these anomalies can be associated with different symptoms, such as dysphagia, stridor and respiratory distress, as a result of vascular rings that lead to compression of the trachea or oesophagus, or both. Some types of these malformations are strongly associated with other congenital heart disease (CHD) and chromosomal abnormalities. The development of multidetector computed tomography (MDCT) has triggered a revolution in the study of the aorta and other large vessels and has replaced conventional angiography in the diagnosis of congenital anomalies of the aortic arch, particularly vascular rings.

Methods: We analysed 149 CT angiographies (139 patients) which were performed from January 2019 till November 2022 in Institute for Mother and Child Healthcare of Serbia “dr

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Vukan Cupic”, on 16 MDCT either in preoperative or postoperative phase, according to indications.

Results: Of 139 patients, 85 (61,1%) were males, 54 (38,9%) females, age between 1day and 16 years (median age 9 months). Majority had left aortic arch with usual branching (82 patients - 59%), 15 patients (10,8%) had Bovin type of aortic arch and 11 patients (8,9%) had aortic arch with four branches (left vertebral artery origin from the aortic arch). Right-sided aortic arch with mirror image branching was noticed in 17 patients (12,2%) with associated CHD (tetralogy of Fallot, truncus arteriosus). Left and right aortic arch with aberrant subclavian artery was present in 8, double aortic arch in 4 and interrupted arch in 2 patients. Hypoplastic aortic arch, aortic coarctation and pseudocoarctation were noticed in 13 patients with left sided aortic arch.

Conclusion: MDCT angiography is a reliable imaging technique allowing for complete evaluation of the aortic arch and branch vessels as well as their relations to surrounding structures, most importantly in preoperative surgical planning. In addition, CT angiography provides important information in postoperative evaluation and monitoring patients with CHD.

Dynamic Contrast Magnetic Resonance Lymphangiography (DCMRL) in Neonates and Children: categorizing imaging findings to predict outcome and to guide therapy

Ralph Gnant¹, Oliver Kretschmar², Eva Kühlwein³, Ueli Moehrlen⁴, Hitendu Dave⁵, Christian Kellenberger¹

1. Diagnostic and Interventional Radiology, Children's Hospital Zurich
2. Cardiology, Children's Hospital Zurich
3. Intensive Care Unit, Children's Hospital Zurich
4. Paediatric Surgery, Children's Hospital Zurich
5. Cardiac Surgery, Children's Hospital Zurich

INTRODUCTION: To describe the technique and report our initial experience with the use of Dynamic intranodal contrast-enhanced magnetic resonance lymphangiography (DCMRL) in children.

MATERIAL & METHODS: Retrospective review of all patients between 0 and 18 years of age who underwent a DCMRL at our institution between January 2018 and December 2022. Needle placement into lymph nodes in each groin was performed by ultrasound guidance under

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

general anesthesia. Gadolinium contrast was injected to acquire dynamic imaging. Technical success was defined as contrast enhancement of the thoracic duct. Patients were categorized into Pulmonary Lymphatic Perfusion Syndrome (PLPS), Central Lymphatic Flow Disorder (CLFD), and surgical leaks. Clinical outcome and therapy options were noted.

RESULTS: 20 patients (7 females) were included in the analysis. Mean age at date of scan was 2yrs and 1 month (range 11d – 9yrs). Indication for DCMRL was congenital chylothorax (n=6), post-cardiac surgery chylothorax (n=12), and plastic bronchitis (n=2). 6 patients showed a lymphatic flow pattern of a PLPS, 7 patients of a CLFD, one patient a surgical complication, and 5 showed a normal flow pattern with anatomical variants. In one patient, the thoracic duct remained unenhanced (95% technical success rate). Additional Lipiodol embolization to close lymphatic leakage was used in 2 patients.

All 6 patients with a PLPS survived, 2 out of 6 with Lipiodol embolization. On the other hand 4 out of 7 patients with a CLFD died, two of them despite surgical pleurodesis. Mean follow-up was 1 year and 8 months (range 4 months – 5 years).

CONCLUSION: DCMRL has evolved as a useful diagnostic tool for neonatal or post-operative high output chylothoraxes. It may guide therapeutic decisions including Lipiodol based closure of lymphatic leakage as well to predict outcome.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Thursday 8th 13.30h-15h

Oncology and Interventional Radiology Session

Imaging of pediatric mandibular tumors

Birgit Spors¹

1. Helios Klinikum Berlin- Buch, Berlin, Germany

Purpose: Mandibular tumors are rare in children and represent a heterogeneous group.

Compared to adults pediatric mandibular tumors showed considerable differences.

Methods/Material: All children with solid mandibular tumors except odontogenic lesions are included between 2017 and 2022.

Available imaging tools: X ray, ultrasound, CT and MRI scans are reviewed

Pathological diagnosis, treatment and recurrences of the tumor are analyzed.

Results: Five patients, were included, with the mean age of the patient being 12 years old (range 7 years to 18 years). 2 benign and 3 malignant tumors with different pathological entities were identified.

Different imaging modalities determines special characteristics of tumor entities.

Conclusion: Radiological signs of the aggressiveness of the tumor do not correlate with malignancy of the tumor.

All image modalities together are necessary to find a diagnosis.

In addition to local imaging, whole body MRI can be helpful to confirm assumed diagnosis.

Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age

Gozde Ozer¹, H. Nursun Ozcan¹, Burak Arda¹, Tezer Kutluk³, Berna Oguz¹, Mithat Haliloglu¹

1. Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Turkey

2. Department of Pediatric Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

3. Department of Pediatric Oncology, Hacettepe University Faculty of Medicine, Ankara, Turkey

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Hepatoblastoma (HB) accounts for two-thirds of primary malignant liver tumors in children and mostly occur under the age of five. Hepatocellular carcinoma (HCC) is the second most common primary malignant liver tumor, often seen after the age of ten. Although some characteristic imaging findings have been described in both HB and HCC, it is difficult to distinguish between these two tumors when a patient is over the age of five.

Materials and methods: The radiology archives were searched to assess HB and HCC patients older than 5-year-old between 2007–2022. Initial MRIs and/or CTs of all patients were evaluated for the presence of background liver disease, signal characteristics of lesions, contrast enhancement pattern, presence of necrosis, central scar, tumor capsule, and portal/hepatic venous involvement. Maximum transverse diameter, PRETEXT stages and annotation factors were noted. In addition to imaging findings, initial symptoms, age at diagnosis, serum alpha-fetoprotein (sAFP) levels, histopathological results, and follow-up data were reviewed.

Results: A total of 19 children (16 boys, 3 girls, mean age=10) were included. There was no significant difference between HB (n=9) and HCC (n=10) groups in terms of age and gender. PRETEXT stage III and IV were more common in HB-group (n=2 and n=6, respectively), and stage I and II were more common in HCC-group (n=3 and n=4, respectively); albeit this failed to reach statistical significance (p=0.053). sAFP values were significantly higher in the HB-group (sAFP-mean=235068 ng/ml) compared to the HCC-group (sAFP-mean=34009 ng/ml) (p=0.002). Tumor size was found higher in the HB-group (mean=133 mm) than the HCC-group (mean=87 mm); however, there was no statistically difference (p=0.06). Also, there was no difference between two groups in presence of necrosis, central scar, and tumor capsule. Initial MRI was available for 6 patients with HB and 7 patients with HCC, and there was no difference regarding ADC-values (HB-group-mean=0.8x10⁻³ mm²/s; HCC-group-mean=1x10⁻³ mm²/s, p=0.13).

Conclusions: In this study, PRETEXT stage and sAFP values were found higher in the HB-group. Although it is difficult to distinguish between HB and HCC with clinical features and imaging findings in patients over 5 years of age, these findings may help in differential diagnosis.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Super-selective embolisation for traumatic non-ischaeamic priapism; a case series**Bevan, J¹, Parthipun, A¹, Jenkins, R¹, Laidlow-Singh, H.,² Lloyd C¹

1. Evelina London Children's Hospital
2. The Royal London Hospital

Purpose / Objectives / Background: Both ischaemic and non-ischaeamic priapism are time-sensitive diagnoses requiring prompt treatment to avoid long-term sexual dysfunction. Non-ischaeamic priapism typically occurs secondary to blunt perineal trauma. At our centres we have performed super-selective embolisation for this condition with satisfactory results, the aim being to obviate the need for surgical management. This case series describes the clinical features and imaging appearances of post-traumatic high-flow priapism and the resultant embolisation technique with clinical outcomes.

Methods and materials: Three cases were selected following review of previous studies at two tertiary paediatric centres. All children (aged 8-10 years) were diagnosed with non-ischaeamic priapism with supportive imaging features of a high-flow lesion. Selective embolisation was performed in all cases.

Results: In all three cases there was a preceding traumatic event (straddle injury). All patients presented with painless priapism that failed to resolve with conservative management. In all three cases, penile ultrasound revealed a high-flow lesion (arteriovenous fistula or pseudoaneurysm). In one case there was diagnostic uncertainty following ultrasound and subsequent aspiration and washout of the corpus cavernosa was performed. In the same case due to negative surgical findings a CT angiogram was performed which demonstrated a high-flow lesion (arteriovenous fistula).

All three children subsequently underwent digital selective angiography confirming a high-flow lesion with embolisation of the affected vessel.

Following the procedure, all three patients showed good clinical outcomes with resolution of priapism and no further adverse events.

Conclusion: Recognition of non-ischaeamic priapism due to a high-flow lesion following trauma is important so that timely treatment can be commenced. Super-selective embolisation

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

is a minimally invasive and accurate treatment method for such lesions. We hope that this case series serves to give confidence to clinicians in their diagnosis and highlights the importance of the involvement of Interventional Radiologists in the management of such patients.

Direct correlation of MRI-DWI and histopathology of pediatric renal tumors through a patient-specific 3D-printed cutting guide: a single-center prospective study

Justine N. van der Beek^{1,2}, Matthijs F. Fitski¹, Ronald R. de Krijger^{1,3}, Marijn A. Vermeulen^{1,3}, Peter G.J. Nikkels³, Arie Maat¹, Marc H.W.A. Wijnen¹, Marry M. van den Heuvel-Eibrink¹, Alida F.W. van der Steeg¹, Annemieke S. Littooi^{1,2}

1. Princess Máxima Center for Pediatric Oncology, Utrecht, The Netherlands
2. Department of Radiology and Nuclear Medicine, University Medical Center Utrecht/Wilhelmina Children's Hospital, Utrecht, The Netherlands
3. Department of Pathology, University Medical Center Utrecht, Utrecht, The Netherlands

Purpose: Invasive procedures to determine histology of pediatric renal tumors before start of therapy are discouraged within the SIOP-Renal Tumor Study Group (SIOP-RTSG). In rare non-Wilms tumors (non-WTs) this may initiate misdiagnosis-based pre-operative chemotherapy. Furthermore, the more frequently occurring WTs often comprise of heterogeneous lesions with distinct pathology. Risk assessment in WTs is based on post-surgical histological subtype, indicating clinical differences. MRI and DWI show potential value as non-invasive biomarker through tumor characteristics and apparent diffusion coefficients (ADCs). This study aims to prospectively analyze MRI-characteristics of histological subtypes of WTs as well as non-WTs, with the purpose to non-invasively discriminate different pediatric renal tumor types based on MRI-DWI.

Materials & Methods: Pediatric renal tumor patients were included based on MRI following standard of care, and treated following the SIOP-RTSG 2016 UMBRELLA protocol. In case of a total nephrectomy, a patient-specific cutting guide based on the pre-operative MRI was 3D-printed, allowing direct comparison of imaging and histopathology based on correlated slices. In case of non-eligibility for a cutting guide, only whole-tumor ADC-values were measured. ADC-values of different diagnoses together with patient- and solid tumor characteristics are statistically analyzed with correlation coefficients and the Mann-Whitney U-test.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Results: So far, 44 patients (47 lesions) with a median age of 2.6 years (range 1-177 months) were included. Thirty-seven lesions were diagnosed as WT, of which 12/37 were regressive tumors. WT appeared T2-hyperintense, T1-hypointense and predominantly heterogeneous. Median tumor volume of WT at diagnosis was 589.7 cm³ (range 3.3-1956.9 cm³), with limited median decrease or even increase (48.1 cm³, range -332.7-561.5 cm³) after pre-operative chemotherapy in stromal type WT. On whole-tumor level, the median- and 25th percentile ADC after pre-operative chemotherapy of stromal type WT (7/37, mean 25th percentile ADC 1.212x10⁻³ mm²/s) were significantly different (p=0.017) from epithelial and blastemal WT-lesions.

Conclusions: This ongoing prospective study shows stromal type WT could be discriminated from more aggressive WT subtypes, showing significantly higher median ADC-values and limited decrease in volume after pre-operative chemotherapy. These findings could be relevant for future decision-making in pediatric renal tumors, especially concerning high-risk tumors, bilateral tumor cases and potential nephron sparing surgery.

Diffuse midline Glioma different locations and tips differential diagnosis

Marta Gómez-Chiari¹, Jordi Muchart¹, Mariana Planells¹, Jarek Smiechowicz¹, Emili Inarejos¹, Andres Morales La Madrid²

1. Pediatric Radiologist Barcelona Children's Hospital Sant Joan de Déu
2. Pediatric Oncologist Barcelona Children's Hospital Sant Joan de Déu

Purpose/Objective/Background: Diffuse midline glioma (DMG) is a heterogeneous group of aggressive pediatric brain tumors with a fatal prognosis. DMG have specific molecular features (H3M and EGFR mutation). Prognosis remains poor, with median survival ranging from 9 to 12 months from diagnosis. Clinical and radiological prognostic factors only partially change the progression-free survival but they do not improve the overall survival.

MRI is a power tools for the diagnosis of DMG, in particular, for Diffuse intrinsic pontine glioma (DIPG), typical findings include a T1-hypointense and T2-hyperintense lesion involving >50% of the pons with patched areas of high perfusion and restricted diffusion. But in others locations the findings could be are unspecific.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Methods: We retrospectively reviewed the MR findings on patients with DMG from January 2017 to January 2023 at a reference Pediatric Hospital.

Material: We review findings on MRI different sequences, trying to describe specific patterns on brain and spine DMG, to search for radiological predictors of H3K27M mutation subtype (H3.3 worse survival than H 3.1), EGFR mutation, and predictors of median survival (morphological sequences, advanced techniques, radiomics).

Results: A total of 38 patients with DMG were included, 18 girls and 20 boys, aged from 4 to 18 years. There were 4 spinal cord tumor, 5 thalamic tumor and 29 pontine tumor. We have evaluated different variables as these: location (central / eccentric), T2 hypersignal with swollen appearance, ADC value (focal restriction), contrast enhancement types and perfusion sequences (vascularization / hyperperfusion), necrosis, bleeding and leptomeningeal extension (craniospinal study).

Conclusion: Location and MRI characteristics (thalamus- EGFR mutation, DIPG phenotype) are highly suspected of DMG. ADC value, ring contrast uptake, tumor extension towards median peduncle or to the midbrain and medullary bulb, quantitative studies measuring tumor volume, CBC, permeability and values of tumor metabolites could be predictive biomarker for H3 K27M mutation status and survival.

RM evaluates deep location of tumors, this limits surgical resection or biopsy. Tumors with unusual presentation and within clinical trials must be biopsied. The diagnosis in the vast majority is clinical-radiological, the role of the radiologist is fundamental (multidisciplinary team - tumor committee).

Retrospective series of renal biopsies in pediatric patients from 2016 to 2022: analysis of complications and outcomes using a standardized protocol

Marta Gonzalo-Carballés¹, Alejandro Cruz-Gual¹, Lluís Riera-Soler¹, Ana Coma-Muñoz¹, Lucía Riaza-Martin¹, Maria Ibnoukhatib¹, Élide Vázquez-Méndez¹

1. Hospital Universitari Vall d'Hebron, Barcelona, Spain

Background: Renal biopsy is a valuable tool for diagnosing and managing renal diseases in pediatric patients. However, it carries a risk of hemorrhagic complications, especially in

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

children, requiring additional diagnostic procedures, blood transfusion, vascular intervention and prolongation of hospitalization.

Objectives: The aim of this study was to evaluate the safety and efficacy of a standardized protocol for performing renal biopsies in pediatric patients, as well as to analyze the incidence of complications and outcomes.

Methods: We performed a single center retrospective analysis of all renal biopsies performed in pediatric patients from 2016 to 2022 at our Pediatric Institution. All biopsies were performed under ultrasound guidance by an experienced radiologist, under moderate sedation by pediatric anesthesiologist and with sample quality examination in the operating room by a nephrologist. We used 18-gauge biopsy needles. All patients underwent analytical and ultrasound monitoring 24 hours after the biopsy, regardless of their clinical stability.

Results: A total of 199 renal biopsies were performed, with 41.7% from kidney transplants and 58.3% from native kidneys. In 97.5% of the samples, sufficient glomeruli were obtained for diagnostic purposes. The incidence of severe complications that required major therapy (interventional radiology embolization or blood transfusion), increased level of care and prolonged hospitalisation (>48h) was only 4% (SIR D), and included progressive perirenal hematoma with active bleeding, arteriovenous fistula with clinical compromise and pseudoaneurysm. No patient presented permanent adverse sequelae (SIR E) or required nephrectomy or died due to biopsy-related complications (SIR F). The protocol for 24-hour analytical and ultrasound monitoring identified mild complications (SIR A-B) consisting of perirenal hematoma (31%) and small arteriovenous fistulas (9.5%) that resolved spontaneously without clinical or hemodynamic repercussions.

Conclusion: Our standardized protocol for performing renal biopsies in pediatric patients under ultrasound guidance, moderate-sedation by pediatric anesthesiologist, sample quality examination in the operating room by a nephrologist is a safe and effective method with low incidence of severe complications. The use of 24-hour analytical and ultrasound monitoring can help identify mild complications and prevent serious adverse events.

Feasibility and diagnostic accuracy of early postoperative MRI after resection of neuroblastic tumors

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Maryanna Chaika¹, Michael Esser¹, Patrick Krumm¹, Riccardo Guglielmi¹, Joerg Fuchs², Steven Warmann², Christian Urla², Juergen Schaefer¹

1. Department of Diagnostic and Interventional Radiology, University Hospital Tuebingen, Hoppe-Seyler-Strasse 3, 72076, Tuebingen, Germany

2. Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital Tuebingen, Tuebingen, Germany

Purpose: In standard MRI, it may be problematic to differentiate residual tumor (RT) from scar, reactive changes, or recurrence after three months. Thus, the oncology societies are working towards establishing early postoperative MRI to evaluate residual tumors after resection of neuroblastoma. The aim of this study was to evaluate a short MRI protocol performed in the early postoperative period.

Materials and Methods: The inclusion criteria of this retrospective single-center study were: Histologically confirmed neuroblastic tumor, resection by the reference surgery in our center, performed early postoperative MRI and adequate MRI preoperatively, and standardized MRI Protocol. The MRI protocol included the following sequences: T1w vibe Dixon before and after contrast, T2w with fat saturation and DWI with the calculation of the ADC map. The analysis was performed by 3 independent readers (resident/adults radiologist/board certified pediatric radiologist) using a 4-points Likert-scale (residual tumor is (1) very likely, (2) possible, (3) unlikely, (4) very unlikely). A multimodal reference standard was determined by: F/U imaging, the surgical report including intraoperative photographs, consensus tumor-board, and consensus between senior radiologist and surgeon.

Results: Thirty-nine patients with a median of 46 age months (5-177) and in 33 cases stage IV were consecutively included. MRI was performed in the mean 8 (+/- 5) days after surgery. RT was found in 13 patients by MRI and confirmed by the reference standard, with a typical location at the mesenteric root and retrocruical. 4 RTs were expected by the surgeons with a median volume of 19 ml (1-34 ml), and nine tumors were unexpected with a median volume of 1 ml (0.25-7). Sensitivity, specificity, and accuracy (reader) were 77, 54, and 70 % (Resident), 81, 85, and 82 % (Adult Radiologist), 92, 92, and 92 % (Pediatric Radiologist). Reading the postoperative MRI alone, the diagnostic performance of the Pediatric Radiologist were 88, 74, and 84%.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Conclusions: Early MRI Protocol is feasible for determination of residual tumor. Experience in pediatric imaging is crucial to achieving high diagnostic precision. Reading the preoperative MRI improves diagnostic accuracy.

Two-year experience of Treatment of Osteoid Osteomas and Osteblastomas in a Paediatric tertiary hospital

Dr. Rituparna Saha¹, Dr. Zishan Sheikh¹, Dr. Moti Chowdhury¹

1. Birmingham Children's Hospital

Purpose/Objective: Osteoid osteomas (OO) and osteblastomas (OB) are benign bone tumours typically presenting with pain. This study describes a two-year experience of treating OO/OB with radiofrequency ablation (RFA) in children.

Materials: A retrospective review was performed of 26 patients with symptomatic OO/OB.

Methods: All patients had a biopsy prior to RFA either on the same attendance where radiological appearance was pathognomonic (n=21), or on separate attendance where imaging was equivocal (n=3). The RFA electrode was placed into the nidus under CT guidance, and thermo-ablation performed at 90°C for 6 min.

Results: Over this period, 26 patients (age 3-16 years) were diagnosed with OO/OB on imaging and/or biopsy. Lesions were in the spine (n=9), appendicular (n=16) and scapula (n=1), and ranged 7-22 mm in size, with 12/26 up to 10mm and 14/26 >10mm.

24/26 patients were treated with RFA; the remaining two following histological diagnosis underwent curettage (n=1) and cryotherapy (n=1). 19/24 patients receiving RFA were successfully treated without relapse or residual symptoms. Five patients where symptoms were refractory/ recurred all had nidus >10mm; RFA was repeated in 2 and awaited in another. The remaining two patients refractory to RFA underwent surgical excision. 22/24 RFAs were uncomplicated post-procedure. One patient who had RFA of OO in the elbow had successful resolution of osteoid-related symptoms but developed radial nerve neuropraxia post-procedure, which resolved spontaneously with conservative management. One patient had post-procedure wound infection.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Correct placement of the biopsy needle and RFA electrode through the nidus was confirmed on CT in all patients; however histological identification of nidus was reported in 21/31 samples (67.7%; 5 biopsies repeated). In one case where biopsy was repeated, the repeat sample was also reported non-diagnostic, and the diagnosis was accepted based on characteristic imaging and symptomatic relief post-RFA.

Conclusions: The study concluded that RFA was successful in treating OO/OB in 79.2% of cases following one ablation, with incomplete ablation most likely in lesions >10mm. Symptom relief post-treatment was a more reliable guide of diagnosis than histology. Where biopsy was performed on a separate attendance prior to RFA treatment, a repeat biopsy is unnecessary during the RFA attendance.

Preoperative Multimodal Assessment of Functional and Metabolic Tumor Volume in Pediatric Rhabdomyosarcoma

Simon Männlin¹, Josephine Berger¹, Maryanna Chaika¹, Robert Grimm², Jörg Fuchs³, Andreas Schmidt³, Helmut Dittmann⁴, Jürgen Schäfer¹

1. Diagnostic and Interventional Radiology, University Hospital Tübingen, Tübingen, Germany
2. MR Application Predevelopment, Siemens Healthcare GmbH, Erlangen, Germany
3. Department of Pediatric Surgery and Pediatric Urology, University Children's Hospital Tübingen, Tübingen, Germany
4. Department of Nuclear Imaging, University Hospital Tübingen, Tübingen, Germany

Purpose: Conventional cross-sectional imaging has failed to predict outcomes in pediatric rhabdomyosarcoma (RMS). Several studies have demonstrated the potential of advanced imaging such as diffusion-weighted imaging (DWI), gadolinium contrast enhanced imaging and 2-deoxy-2-fluoro-D-glucose positron emission tomography (PET). Due to the inhomogeneity of tumor volumes, recent studies have also shown the potential and the advantage of analyzing tumor volumes on a voxel-wise basis. Aim of this study is to evaluate the potential value of generating tumor subvolumes in pediatric RMS applying voxel-based analysis of functional and metabolic data from contrast enhanced PET/MRI.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Methods: 24 patients, who received PET/MRI after at least two cycles of chemotherapy, were enrolled. The volume of interest included whole tumor volume. Adherent diffusion coefficient (ADC) and standard uptake values (SUV) were measured on a voxel- wise basis as well as post gadolinium contrast enhancement in relation to mean muscle post gadolinium contract enhancement. A gaussian mixture model was used to fit multiple gaussian distributions to the collective voxel- by- voxel data. Several different mixture models with up to twelve Gaussian distributions were fitted and compared using the Akaike information criterion and Bayesian information criterion. A mixture of seven distributions (Cluster 1- 7) was determined as best fit for the data. The ratio of these clusters to total tumor volume were correlated with clinical and histopathological parameters. The area under the receiver operating characteristic curve (AUC) of the various clusters was calculated using logistic regression analysis to predict event free survival.

Results: Significant differences of the ratios of clusters Cluster 1, Cluster 4 and Cluster 6 to total tumor volume could be found depending on whether embryonal or alveolar histopathologic subtype was present (each $p < 0.05$).

Cluster 3 (AUC 0.868), Cluster 4 (AUC 0.789) and Cluster 5 (AUC 0.897) showed high AUC predicting event free survival of patients using logistic regression analysis.

Conclusions: These results show that voxel- wise analysis of multimodal data in RMS based on DWI, gadolinium contrast enhanced MRI and PET is feasible. The results also suggest, that the variance of the distribution of tumor subvolumes might have prognostic significance.

Virtual reality glasses: distraction technique to reduce sedation rates in children undergoing interventional radiology procedures

Elisa Aguirre Pascual¹, Carmen Gallego Herrero¹, Maria Navallas¹, David Coca Robinot¹, Maria Pont Vilalta¹

1. Pediatric Radiology Department Hospital 12 Octubre, Madrid

Background: Several sedation techniques, such as topic, oral, intravenous, or intramuscular, are used in children to perform interventional procedures. Recently, literature has shown virtual reality (VR) to be an effective non-invasive modality during induction of general anesthesia to

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

reduce preoperative anxiety in children. The VR headset is a medical device class I that delivers a psychological intervention with a relaxation hypnotherapy software. The purpose of this distraction technique, used as a stand-alone therapy or combined with other therapies, is to ensure patient's comfort during medical procedures by reducing patient's anxiety and pain perception.

Purpose: This study was designed to evaluate the feasibility and effectiveness of immersive audiovisual distraction with a VR headset to reduce or avoid pharmacological sedation in children subjected to interventional procedures.

Material and methods: An intervention pilot study was performed in children who agreed in advance to use the VR headset as a substitute of general anesthesia, deep or light sedation. Informed consent was obtained. Eligibility for inclusion was all consecutive children ages 6–16 years without severe psychomotor delay who needed an interventional procedure during the 6-months trial of the VR device. Children for whom the VR headset did not fit properly were excluded. Child pain level was assessed by using a Visual Analog Scale (VAS).

Results: 26 procedures were done in 24 patients (15 female) whose age ranged 5–18 years (mean 13.7 years, standard deviation 2.7 years). Two of them had mild psychomotor delay (7.7%). A variety of procedures were performed: fine needle aspiration (FNA) (n=3), FNA and percutaneous biopsy (n=6), percutaneous biopsy (n= 5), peripheral insertion of a central catheter (n=4), varicocele embolization (n=3), tunneled peripheral venous catheter removal (n=1), intramuscular tetanic toxoid infiltration (n=1), thoracic drainage (n=1), cervical abscess drainage (n=1) and hip arthrocentesis (n=1).

Most patients were comfortable during the procedure (VAS \leq 5 in 21 procedures). Two patients suffered intense pain (VAS=8) due to the nature of the invasive procedure (thoracic drainage and peripheral nerve biopsy). No complications were reported.

Conclusion: VR glasses audiovisual aid was found to be an effective distraction method in children who underwent minimal invasive interventional procedures.

Potential role of MRI-based radiomics in prediction of chemotherapy response in pediatric patients with Ewing-Sarcoma

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Julia Miedler¹, Dr. med. Matthias Schaal¹, Jun.-Prof. Dr.-Ing. Michael Götz¹, Prof. Dr. Holger Cario², Prof. Dr. med. Meinrad Beer¹

1. University hospital of Ulm, Department for Diagnostic and Interventional Radiology, Ulm (Germany)

2. University hospital of Ulm, Department for Pediatrics and Adolescent Medicine, Ulm (Germany)

Purpose/Objective/Background: Neoadjuvant chemotherapy plays an essential role in pediatric Ewing-Sarcoma. Postsurgical histopathological examination for Salzer-Kuntschik regression grade represents the current gold standard to assess chemotherapy response. Since this occurs rather late during treatment, we addressed the resulting need for earlier predictive markers by assessing MRI-based radiomics signatures at baseline and under chemotherapy, focused on distinction between good (Salzer-Kuntschik grades 1-3) and poor response (Salzer-Kuntschik grades 4-6).

Materials&Methods: In this single-center retrospective study all pediatric Ewing-Sarcoma patients treated at our institution (n(2011-2020)=23) were primarily included. The final patient cohort consisted of 16 children, 9 with Salzer-Kuntschik regression grade (mean age: 12,61±2,93; good response:n=5; poor response:n=4) without externally started chemotherapy, with consistent MRI protocols (T1-TSE native, T1-TSE fs contrast enhanced, T2-TSE and T2-TIRM/STIR) and with baseline (n(t0)=4/5 sequence depending) plus two follow-up examinations (after the 2nd/3rd [n(t1)=9] and after the 5th/6th [n(t2)=9] cycle of chemotherapy according to “EWING 2008”). Segmentation and radiomic feature extraction were performed using mint LesionTM (Heidelberg,Germany). Cohen’s *d* or Hedges *g* was calculated for features where the two groups showed different value ranges at t0. Separately, the further course from t0 to t1 and t1 to t2 was analyzed.

Results: In total 25 histogram based and 26 GLCM (gray-level co-occurrence matrix) based radiomic features as well as min., mean, and max. signal intensity were analyzed based on whole tumor volume.

Several radiomic features were found at t0. The highest Cohen’s *d*/Hedges *g* at t0 was found at “Minimum histogram gradient” in T2-TIRM/STIR including edema ($d=18,86[1,12-18,86]$).

In the further-course-analyzation from t0 to t1, one feature in T2-TIRM/STIR and 29 features in T2-TIRM/STIR including edema were found. From t1 to t2 one feature in T2-TIRM/STIR

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



including edema was found. For most of these features patients with good response showed decreasing (mean change:-16%) and patients with poor responses increasing (mean change:+85%) values.

Conclusion: Radiomic features seem to have a potential to distinguish between children with good and poor response already before and during chemotherapy of Ewing-Sarcoma. Further multicenter studies with larger cohorts have to be done.

Thursday 8th 15:30h-17h

Child Abuse, Postmortem And Miscellaneous Session

Rib fracture diagnosis in suspected abuse: computed tomography or radiographs (RECEPTOR): a multicentre diagnostic accuracy observational study

Nasser Alzahrani^{1,2}, Michael Paddock^{1,3}, Annmarie Jeanes⁴, Alan S. Rigby⁵, Amaka C. Offiah^{1,6}, On behalf of the RECEPTOR Study Research Group

1. Department of Oncology and Metabolism, University of Sheffield, Damer Street Building, Western Bank, Sheffield S10 2TH, United Kingdom
2. Diagnostic Radiology Department, College of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia
3. Medical Imaging Department, Perth Children's Hospital, Perth, Western Australia, Australia
4. Department of Paediatric Radiology, Leeds Children's Hospital, Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom
5. Hull York Medical School, Hull, United Kingdom
6. Department of Radiology, Sheffield Children's NHS Foundation Trust, Western Bank, Sheffield, United Kingdom

Purpose: Rib fractures are strongly associated with physical abuse in young children. Chest radiography is the standard imaging method for the diagnosis of rib fractures in children with suspected physical abuse (SPA). Studies have shown that chest computed tomography (CT) has greater accuracy than initial chest radiographs (CXR) in detection of acute and healing rib fractures in children with SPA. This multicentre study aims to assess the diagnostic accuracy

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





of chest CT in the detection of rib fractures in children investigated for SPA using initial and follow-up CXR as reference standard.

Material and Methods: A ten-year (9/2011 to 9/2021) multicentre retrospective search of children under 2 years old who had CXRs as part of the initial and follow-up skeletal survey and chest CT performed for SPA. Radiologists were recruited as reporters on a voluntary basis via membership databases from the Child Abuse Taskforce of the European Society of Paediatric Radiology. The anonymised CXRs and CT data sets were sent to the readers via a password-protected and encrypted filesharing website (Google Drive). Radiologists independently read images in three reads: Read 1 (initial CXRs only), Read 2 (CTs only) and Read 3 (initial and follow-up CXRs), performed at least one month apart and the order of reads 1 and 2 were varied between observers, but no observer performed Read 3 before Read 1 or 2. Radiologists reported on the presence of rib fractures, fracture age, fracture location and the confidence level of interpretation. The diagnostic accuracy will be assessed by calculating sensitivity, specificity, positive predictive value, and negative predictive value.

Results (Still in progress): A total of 64 cases (34 male) with an average age of 3 months were included and independently assessed by 19 consultant radiologists. Data analysis is on-going and results of diagnostic accuracy will be presented at the conference.

Conclusion: Chest CT might appear to offer improved diagnostic accuracy in the detection of rib fractures in live children who may have been abused, thus rendering CXRs as part of the follow-up SkS redundant.

International consensus statement on the radiological screening of contact children in the context of suspected child physical abuse

Jai Sidpra¹, Kshitij Mankad², David M Mirsky³, Adam J Oates⁴, Gabrielle C Coleman⁵, Leandro T Lucato⁶, Elaine Kan⁷, Tracy Kilborn⁸, Nina Agrawal⁹, Arianne H Teeuw¹⁰, Patrick Kelly¹¹, Deborah Zeitlin², Jamieson Carter¹², Geoff D Debelle⁴, Rachel P Berger¹³, Cindy W Christian¹⁴, Daniel M Lindberg³, Maria Raissaki¹⁵, Maria Argyropoulou¹⁶, Catherine Adamsbaum¹⁷, Timothy Cain¹⁸, Rick R van Rijn¹⁰, V Michelle Silvera¹⁹, Andrea Rossi²⁰, Alison M Kemp²¹, Arabinda K Choudhary²², Amaka C Offiah²³

1. University College London
2. Great Ormond Street Hospital for Children

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

3. Children's Hospital Colorado
4. Birmingham Children's Hospital
5. Children's Health Ireland and The National Maternity Hospital
6. Universidade de São Paulo
7. Hong Kong Children's Hospital
8. Red Cross War Memorial Children's Hospital
9. City University of New York Graduate School of Public Health and Health Policy
10. Emma Children's Hospital – Amsterdam UMC
11. Starship Children's Health
12. Brighton and Sussex Medical School
13. UPMC Children's Hospital of Pittsburgh
14. The Children's Hospital of Philadelphia
15. University Hospital of Heraklion
16. University of Ioannina
17. Paris Saclay University
18. Royal Children's Hospital Melbourne
19. Mayo Clinic
20. IRCCS Istituto Giannina Gaslini
21. Cardiff University
22. University of Arkansas for Medical Sciences
23. Sheffield Children's Hospital

Objectives: Physical abuse is a common but preventable cause of long-term childhood morbidity and mortality. Despite the strong association between abuse in an index child and abuse in contact children, there is no guidance outlining how to screen the latter, significantly vulnerable group, for abusive injuries. In consequence, the radiological assessment of contact children is often omitted, or variably performed, allowing occult injuries to go undetected and increasing the risk of further abuse. We present an evidence-informed international consensus statement for the radiological screening of contact children in the context of suspected child physical abuse.

Methods: This consensus statement is derived from a systematic literature review and 3 meetings of the International Consensus Group on Contact Screening in Suspected Child

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Physical Abuse: a panel of 26 experts invited to participate in this modified Delphi consensus process. Participating board-certified (or equivalent) experts included 9 child abuse paediatricians, 9 paediatric radiologists, 7 paediatric neuroradiologists, and 1 emergency medicine physician with a minimum post-qualification experience of 10 years in the management of children with suspected physical abuse. Consensus was defined as $\geq 80\%$ agreement. The consensus statement was reviewed and endorsed by all authors.

Results: Contacts are defined as the asymptomatic siblings, cohabiting children, or children under the same care as an index child with suspected child physical abuse. All contact children should undergo a thorough physical examination and a history elicited prior to imaging. Contact children aged less than 12 months should have neuroimaging, the preferred modality for which is magnetic resonance imaging, and skeletal survey. Contact children aged 12-24 months should undergo skeletal survey. No routine imaging is indicated in asymptomatic children aged over 24 months. Follow-up skeletal survey with limited views should be performed if abnormal or equivocal at presentation. Contacts with positive findings should be investigated as an index child.

Conclusions: We report consensus recommendations for the radiological screening of contact children in the context of suspected child physical abuse: establishing a consistent approach to the evaluation of these at-risk children and providing clinicians with a reference standard from which to advocate for them.

Combined Prenatal US and Post-mortem fetal MRI: can they replace conventional autopsy for fetal body abnormalities?

Marine Moeremans¹, Fred E. Avni¹, Nicky d'Haene², Ngoc My Lam², Thierry Metens³, Aurélie D'Hondt¹

1. Department of Radiology, Hôpital Delta (CHIREC), 1160 Brussels, Belgium

2. Department of Pathology, Hospital Erasme, Université Libre de Bruxelles (ULB), 1070 Brussels, Belgium

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

3. Department of Radiology, Hôpital Erasme, Université libre de Bruxelles (ULB), 1070 Brussels, Belgium

Background: The acceptance of conventional autopsy (CA), the gold-standard method for investigating fetal death, often remains problematic. Post-mortem Magnetic Resonance Imaging (PMMRI) is increasingly advocated, particularly for neurologic malformations. However, PMMRI performances to diagnose non-neurologic malformations remains unclear. We aim to clarify whether a full body CA remains needed after prenatal ultrasound (US) and PMMRI in assessing non-neurologic fetal malformations.

Methods: In this retrospective IRB-approved study, during a six-year period, all fetuses who underwent PMMRI, prenatal US and full body CA were included. Body abnormalities were identified in US, PMMRI and CA reports and graded as major (two points) or minor (one point). Each technique (US, PMMRI, CA) was given a score by adding all grading points. In each fetus, results were compared for both separate and combined US and PMMRI to CA. Sensitivity and specificity were calculated for detecting major abnormalities.

Results: 50 fetuses were included. The score of CA, US and PMMRI was respectively 53, 37, 46. In comparison with combined US-PMMRI, CA added information in 2 cases (4%) with major abnormalities and 7 cases (14%) with minor abnormalities. PMMRI and prenatal US were concordant in 36/50 (72%) fetuses. Separate US/PMMRI sensitivities and specificities for detecting major body malformations respectively were 80%/80% and 100%/94%. Combined US-PMMRI had a sensitivity of 90% and a specificity of 94%. Two cardiac malformations (2/6) were only described by CA.

Conclusions: After prenatal US and PMMRI, few additional fetal body malformations are discovered with CA. Nevertheless, fetal heart autopsy remains mandatory.

Submission Preview: Structuring International Pediatric Radiology coverage at a major United States Academic Children's Hospital

Benjamin Taragin, MD¹, Cathleen Egan¹, Susan Sotardi¹, Summer Kaplan¹

1. Childrens Hospital of Pennsylvania

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Historically, International Teleradiology (IT) has been a useful Radiology enterprise resource providing overnight coverage to small group hospital-based practices, remote practices or outpatient practices with volume overflow.

Previously enacted United States governmental regulations have negatively impacted IT's utility in tertiary care centers and other centers with large population of government-sponsored insurance. Pediatric Radiology is currently experiencing a tremendous shortage of clinical providers. This is coupled with increased volumes of up to 50% at Major pediatric centers and further volume influx of telerad contracts and responsibilities. Existing national pediatric Radiology staffing shortages are also exacerbated by increasing hospital demands for 24-Hour attending coverage in tertiary pediatric teaching hospitals. Increasing on call responsibilities and challenges of inadequate overnight coverage have been listed as major causes of radiologist burnout. We describe the creation and effect of ABR certified pediatric IT at a major U.S. Pediatric Hospital.

Methods: Metrics used to assess the change in functionality of the radiology department with increased staffing included turnaround times for all studies performed during the overnight shift on nights when additional staffing was and was not available and staff surveys performed at the end of the overnight shifts both with and without additional coverage.

Materials: Problems and solutions addressed include including provider selection, resource selection, connectivity issues and redundancy, state license ship, remuneration scale and logistics, Hospital onboarding, RIS case-sorting and selection as well as legal & financial planning. Specific technical issues that will be addressed include acquisition of required diagnostic computers, monitors, internet speed requirements, redundancy of the above, Meraki or other vendor Vpn, institutional network connectivity, including telephone and videoconferencing.

Conclusion: Upon successful creation of this position there was improved departmental functionality as defined by report turnaround time as well as improved job satisfaction and morale of existing in house staffing. Ultimately the creation of subspecialty specific international teleradiology positions has the potential to alleviate subspecialty specific Radiology Staffing shortages in academic centers and associated burnout.

CT carbon calculator

Michael Jackson¹, Debbie Harries¹, Vivek Raja¹

1. NHS Lothian, University of Edinburgh

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Manifestations of the climate crisis are occurring with increasing frequency and alarming severity. Healthcare providers are committed to the principles of non-maleficence and justice. High-energy resources such as CT and MRI must therefore be used judiciously.

Aim: To develop a web-based application providing an estimate of the carbon footprint of specific CT examinations. Inclusion of such an estimate in radiology reports will prompt clinicians and radiology staff to renew efforts to eliminate unnecessary imaging, and will provide impetus to industry partners to develop energy efficient machines.

Methods: Medical physics and a computer scientist used measurements of scanner consumption obtained by a group in Australia [1]; other published figures[2]; local dose audit data (adult and paediatric); and previously established relationships between various patient size surrogates and CTDI_{vol} to develop approximate relationships between kWh energy usage and various user inputs. These inputs were: body region; and either DLP, patient weight, or patient age. A simple to use web-based interface was constructed allowing users to select relevant criteria to tailor the estimate to specific cases. The more criteria provided (for example, scan DLP as well as age), the more accurate the estimate will be, but an approximate estimate can be delivered based on scanned body region and patient weight or age.

Results: The application is anticipated to be online by the time of the meeting. Typical carbon cost of a CT scan is approximately 15.5 KgCO₂ e, although electricity consumption at the point of scanning only represents a small fraction of this total (0.06 – 0.29 kWh per paediatric chest scan; 0.13 – 0.067 kg of CO₂ per scan).

Conclusion: Inclusion of carbon footprint in radiology reports can act as a behavioural “nudge” to help reduce unnecessary imaging and to promote energy efficiency. The introduction of this CT carbon cost calculator will hopefully stimulate further efforts to deliver imaging in a climate-aware fashion.

References:

[1] The carbon footprint of hospital diagnostic imaging in Australia Scott McAlister,^a * Forbes McGain,^b Matilde Breth-Petersen,^c David Story,^d Kate Charlesworth,^e Glenn Ison,^f and Alexandra Barratt *The Lancet Regional Health - Western Pacific* 2022;24: 100459

[2] The Energy Consumption of Radiology: Energy- and Cost-saving Opportunities for CT and MRI Operation Tobias Heye, Roland Knoerl, Thomas Wehrle, Daniel Mangold, Alessandro

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Cerminara, Michael Loser, Martin Plumeyer, Markus Degen, Rahel Lüthy, Dominique Brodbeck, and Elmar Merkle. *Radiology* 2020 295:3, 593-605

Prevalence of metaphyseal fractures in infants with and without evidence of abusive head injury: Does shaking cause metaphyseal fractures?

Um-Kalsum Rashed¹, Amaka Offiah², Daniel Connolly³

1. The Medical School, University of Sheffield, ukrashed1@sheffield.ac.uk
2. Sheffield Childrens Hospital, a.offiah@sheffield.ac.uk
3. Sheffield Childrens Hospital, daniel.connolly1@nhs.net

Background: Metaphyseal fractures (or classic metaphyseal lesions, CMLs) were first linked to abuse in 1957 by Caffey and have since been identified as a highly specific marker of physical abuse in infants. The mechanism of injury linked to these fractures may be consistent with those exerted when an infant is shaken. This study tests the hypothesis that shaking is a cause of CMLs.

Material and Methods: We performed a retrospective review of all radiographs of infants investigated for suspected child abuse over a period of 15 years. Infants who had a skeletal survey for inflicted injury and a CT head were identified and number and type of fractures and presence of features of shaking were extracted from the reports and medical notes. Statistical analysis (independent t-test and linear regression) was performed using SPSS Version 28 for Mac. The level of significance was set at $P < 0.05$.

Results: A total of 102 infants had at least one of the following: fracture at other location ($n=50$), shaking feature ($n=34$), skull fracture ($n=43$) or CML $n=9$. The prevalence (per patient) of CMLs in infants with and without at least one feature of shaking was 5.9% and 5.6%, respectively ($P=0.95$). Of 28 infants ≥ 40 weeks of age, only 1 (3.6%) had any feature of shaking ($P < 0.001$), however age did not correlate significantly with presence of CML ($P=0.079$). The number of shaking features per patient ranged from 1 to 5. Correlation between the number of shaking features and presence of CML for the whole group and for the 34 with at least one shaking feature was not significant ($P=0.938$ and 0.989 , respectively).

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusions: Although the overall number of CMLs in the study cohort was small (8.8%), 33% of recruited infants had at least one feature of shaking, without a statistically significant number of CMLs compared to the non-shaken group. Results suggest that shaking is unlikely to be a mechanism for CMLs. Validation in a larger cohort may be warranted.

When Greens Are Not So Good for You. Soft Tissue Foreign Bodies: a Radiology and Plastic Surgery Perspective

Dr Fiona Katherine McCurdie^{1,2}; Dr Harsimran Laidlow-Singh²; Mr Simon Filson¹; Miss Jana Torres-Grau²; Dr Rui Santos²

1. Evelina London Children's Hospital
2. Guy's and St Thomas' NHS Foundation Trust

Objectives: Suspected soft tissue foreign body (FB) is a common presentation in paediatrics. These cases are often a diagnostic and radiological challenge, particularly when the FB is organic matter. Timely recognition and management of retained FB are essential to avoid potential significant consequences.

We present a series of occult and unusual FB cases from our tertiary centre, with examples of multimodality imaging and intraoperative photographs.

We propose an imaging pathway for use in the radiology department that aids the management of these cases.

Methods & Materials: Cases were identified by reviewing all imaging investigations for FB, and the plastic surgery caseload, over the last 5 years. We reviewed multimodality imaging characteristics, details of clinical presentation, intra-operative findings and photographic documentation.

In addition, we undertook a literature review and reviewed UK and international imaging guidelines.

Results: We present a series of unusual, complex and occult FBs, including: cactus spines, large shards of wood, glass, needles and metallic debris.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Organic FBs tend to be occult on plain radiograph. Secondary signs (periosteal reaction, soft tissue swelling) can alert to the presence of an occult FB. In these cases, CT is rarely specific enough to add value and so should be avoided, to minimise ionising radiation.

Ultrasound is useful to identify FB and FB reaction, sinus or abscess formation. It has limits in further characterising the FB and rarely helps identify bone involvement.

MRI is extremely useful and demonstrates inflammatory/ infective sequelae. Multiplanar reformatting is helpful for operative planning.

Whilst there is recognised international imaging guidance for ingested or inhaled FBs, there is little guidance for the management of soft tissue FBs. We propose an imaging pathway for soft tissue FBs from our department.

Conclusions:

- Soft tissue FBs are common in paediatrics and present a diagnostic and radiological challenge.
- Close liaison with clinical colleagues is essential to tailor appropriate imaging.
- Organic FBs are rarely radiopaque and plain radiograph and CT are limited. Ultrasound and MR are superior and offer information about inflammatory/ infectious sequelae.
- We propose an imaging pathway for soft tissue FBs and share experiences from our centre.

Imaging findings of head and neck juvenile xanthogranuloma, in 10 patients

Chalard F¹, Nguyen T¹, Donadieu J², Ducou le Pointe¹

1. Hopital Armand Trousseau, Pediatric radiology
2. Hopital Armand Trousseau, Pediatric onco-hematology

Purpose: Juvenile xanthogranuloma (JXG) is the commonest non-Langerhans cell histiocytosis, occurring mainly in infancy. The skin is the most frequent site of JXG, the lesions being located in the head, the neck or the trunk. The diagnosis of extra cutaneous JXG is challenging, due to its rarity, as well as its wide clinical spectrum ranging. Here we propose to demonstrate and characterize imaging features of ten patients with JXG of the head and neck in various locations.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Material and methods: From a cohort of 58 JXG presented to our hospital between 2006 and 2021, we selected the ten JXG located in the head and neck. We recorded clinical data and reviewed all imaging studies. Seven patients had a magnetic resonance imaging (MRI), one had an ultrasound (US) and two had an US, a computed tomography (CT) as well as MRI. We chose the following imaging characteristics: echogenicity and vascularization on US, spontaneous density on CT, signal intensity on T₂-weighted image, apparent diffusion coefficient (ADC) and enhancement on MRI, tumor boundaries and bone lesion on all studies.

Results: Of the ten patients, there were eight patients below the age of two years (one below the age of one year) and two above the age of two. The lesions were located in the skin, the soft tissues, the skull and the intra cranial compartments. Tumors were well-defined in eight cases and bone erosion was present in three cases. On US, the appearance of the lesions was either hypo or hyper echoic and with or without vascularization. On CT, the lesions were spontaneously hyper dense. On MRI, the lesions were hypo intense on the T₂ image in six of nine patients, had a low ADC in six of seven patients and enhanced in seven out of seven patients.

Conclusions: The diagnosis of extra cutaneous JXG is difficult, but may be proposed, based on the following non-specific but suggestive imaging criteria: well-defined lesion, enhancement, T₂ hypo intensity and low ADC components and possible adjacent bone destruction.

Imaging findings of pulmonary and extrapulmonary sarcoidosis in children

Gozde Ozer¹, H. Nursun Ozcan¹, Nagehan Emiralioglu Ordukaya², Rahsan Gocmen¹, Berna Oguz¹, Nural Kiper², Mithat Haliloglu¹

1. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey

2. Department of Pediatric Pulmonology, Hacettepe University School of Medicine, Ankara, Turkey

Background: Sarcoidosis is about ten times less common in children than adults, therefore there is still limited data in the literature concerning pediatric sarcoidosis. Although lungs and hilar lymph nodes are the most common affected organs, multiorgan involvement is more

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



common in children than in adults. This study aims to describe pulmonary and extrapulmonary imaging findings in pediatric sarcoidosis patients.

Materials and Methods: The radiology archives were searched to identify patients diagnosed with sarcoidosis between 1995-2022. A total of 21 patients (10 boys and 11 girls, mean age 13.1) with sarcoidosis were found. Demographic features, initial symptoms, and follow-up data were noted. Histopathologic confirmation, initial chest radiographs and CTs, and extrapulmonary radiologic evaluations of patients were reviewed retrospectively.

Results: The most common presentations were constitutional symptoms including fever and weight loss. Histopathologic confirmation was available for 17 patients and the most common biopsy site was lymph nodes (n=9). Initial chest radiographs were evaluated according to the Scadding staging system and 7 patients had stage 0 (30%), 6 patients had stage 1 (28%), and 8 patients had stage 2 (38%) disease. There were no stage 3 and 4 diseases at the time of diagnosis. On CT, mediastinal/ hilar lymphadenopathies (n=14) and perilymphatic nodules (n=14) were the most common imaging findings, followed by peribronchial thickening (n=9). Pulmonary fibrosis was developed in two patients with stage 2 disease at the time of diagnosis. Multiorgan involvement was found in 18 patients and three or more organs involved in 10 patients. The most common extrapulmonary findings were splenomegaly (n=10) and peripheral/intraabdominal lymphadenopathies (n=8). Other common involvement sites were eye (n=8), parotid gland (n=4), and central nervous system (n=3).

Conclusions: Chest involvement patterns of sarcoidosis seem to have some differences from adults. In this study, unlike adults, stage 3 and 4 pulmonary diseases at the initial diagnosis were not found. Also multiorgan involvement is frequent in children and the most common extrapulmonary imaging findings were splenomegaly and lymphadenopathy.

Significant increase in complicating upper respiratory tract infections in children during the 2022/2023 winter season – a post COVID effect?

Corona Metz¹, Simon Veldhoen¹

1. Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Pediatric Radiology, Berlin, Germany

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Purpose/Objective/Background: Upper respiratory tract infections usually peak during winter months. The purpose of this study was to investigate a clinically noticeable increase in imaging of complicating upper respiratory tract infections in children during the winter season of 2022/2023.

Materials/Methods: MRI and CT scans of children (<18years) with upper respiratory tract infections performed in the Department of Radiology between October 2022 and March 2023 were analyzed regarding presence of the following complications: Mastoiditis, abscess, phlegmon, meningitis, reactive vasculitis, and sinus vein thrombosis. If pathogen detection was performed, this information was obtained. Data were compared with MRI and CT scans performed in the same months of the last four years, distinguishing between pandemic and pre-pandemic years.

Results: During the 2022/2023 winter season, the number of MRI and CT scans in children with upper respiratory tract infections (mean age, 6±5years; median age, 6years; mean prior age, 8±6years; median prior age, 7years) increased significantly compared to the four prior winter seasons (n=89, prior mean n=29; p=0.01). Image-based diagnosis of complications increased significantly (n=80, prior mean n=22; p=0.01). The complication rate increased from an average of 72% to 90%, which did not reach the level of statistical significance (p=0.06). Particularly, vascular complications increased from three cases within the last four years to seven cases in the recent winter season. In 80 of 89 cases the pathogen detection was available with 70% bacterial infections (prior 21 of 29 cases, average rate of 65% of bacterial infections; p>0.05). 80% of those were caused by streptococcus species (prior mean 65%; p>0.05).

During the first complete pandemic winter season in Europe (2020/2021) a significantly reduced number of CT and MRI scans of (complicating) upper respiratory infections in children and a significantly decreased complication rate was observed compared to the pre-pandemic winter seasons, the second pandemic (2021/2022) and the recent winter season (all p<0.5).

Conclusions: After a decline during the first pandemic winter season, there was a marked rebound in imaging complicating upper respiratory tract infections in children, with a significant increase in cases during the 2022/2023 winter season compared with the years before and during the pandemic.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Clinico-radiological rounds with ultrasonography in neonatal intensive care unit

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Prashanth Gowda²

1. Sri Devraj Urs Academy of Higher Education and Research Tamaka, Kolar, Karnataka, India
2. Motherhood womens and children Hospital, Bengaluru, karnataka, India

Purpose:

- Setting protocol for neonatal imaging along with neonatologists.
- Assessing progress of the pre term babies in routine clinic-radiological rounds.
- Utilization of doppler in evaluation of intracranial pressure in hydrocephalus and prognostic indicator of infarcts.
- Effectiveness of approach by Pediatric Radiologist in presence of Neonatologists.
- Validating clinical spectrum with imaging findings.

Methods & Materials:

- Prospective study of neonatal ultrasonography in neonatal intensive care unit across multiple mother and child hospital.
- Sample size of 1000 neonates including preterm and term babies over a period of 2 years.
- Routine clinic-radiological rounds with neonates and registrars in evaluation of term and preterm neonates.
- Ultrasonography includes cranium, abdomen and pelvis, hip joints, chest, neck, extremities and doppler valuation of vessels.
- Majority of cases were having Neurosonogram in preterm neonates with serial evaluation.
- Clinicians include Neonatologist, Resident Pediatricians, Pediatric surgeons, fellows and Locum pediatricians.

Results: New protocol has been set in neonatal intensive care unit for performing ultrasonography. Standardizing normal parameters taken during clinic-radiological rounds including size of organs, resistive index of arterial doppler, etc. Periventricular leukomalacia in most common findings in preterm brain. Intracranial haemorrhages are most common complication in preterm neonates. Early necrotizing enterocolitis is detected as early as 3rd day of life. Perforation is commonly seen with necrotizing enterocolitis and meconium ileus. Resistive index of anterior cerebral artery doppler study is best indicator of intracranial pressure

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



in hydrocephalus. Chest ultrasonography is best method in identifying minimal pleural effusion and identifying pneumonia in hidden areas of chest radiograph. Timing of study is fixed and followed over a period of time, for example hip ultrasonography, renal pelvicalyceal dilatation of pelviureteric junction obstruction.

Conclusion:

1. Clinico-radiological rounds is essential and novel approach in neonatal intensive care unit.
2. Improved assessment of neonates with combined clinical and radiological evaluation.
3. Eliminating discrepancies in clinical and radiological findings thus helping clinician for better treatment options.

New protocol generation and application for routine assessment of neonates with ultrasonography in presence of clinicians.

Friday 9th 9h-9:30h

GI and GU Session

Shear wave elastography and shear wave dispersion correlated to biopsy in scheduled follow-up of pediatric liver grafts

Ivan Cetinic^{1,*}, Charlotte de Lange^{1,2}, Nils Ekvall³, Gustaf Herlenius⁴, William Bennet⁴, Kerstin Lagerstrand^{5,2}, Hanna Hebelka^{1,2}

1. Department of Radiology & Pediatric Radiology, Sahlgrenska University Hospital, Gothenburg, Sweden
2. Institution of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Sweden.
3. Department of Pediatric Medicine, Sahlgrenska University Hospital, Gothenburg, Sweden
4. Department of transplantation surgery, Sahlgrenska University Hospital Gothenburg
5. Department of Medical Physics and Techniques, Sahlgrenska University Hospital, Gothenburg, Sweden

*Correspondence: ivan.cetinic@vgregion.se; Tel.: +46-(0)-31-3427926

Background: Uncomplicated grafted livers in adult recipients have been shown to display increased liver stiffness, reflected as increased ultrasound shear wave elastography (2D-SWE)

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



values, however, this has not been systematically verified with histopathology. Further, it is unknown if this also applies in pediatric liver recipients and how the shear wave dispersion (SWD) value, as a potential marker of inflammation/edema, is displayed in pediatric patients.

Purpose: To compare 2D-SWE and SWD values with histopathology in pediatric liver recipients admitted for an elective follow-up.

Material and methods: In 45 consecutive pediatric liver recipients [median age 10.9 years (ranges 1.4-18), 25 males (55,6%)], all part of a longitudinal follow-up (range 6 months to 17 years) after liver transplantation, 2D-SWE was performed in conjunction with an elective liver biopsy. Additionally, SWD was also obtained in 20 of the 45 children. SWE values were compared to histologically none to mild fibrosis (F0-1) and moderate to severe fibrosis (F2-4) respectively. Inflammation was digitomized into low grade (grades 0-1) and higher grades (grades 2-4) of inflammation. Both fibrosis and inflammation were graded according to Batts & Ludwig classification system.

Results: The number of individuals and median (range) of SWE value (kPa) for each stage of fibrosis was; F0-1[n=23; 5.8 (3.2-16.1)], F2 [n=21; 6.0 (4.5-25.9)], F3[n=1; 33.3], F4[n=0]. No significant difference in SWE values was found between F0-1 versus F2-4 (p=0.062). The median SWD value in the 20 patients with low-grade inflammation was 13.7 m/s Khz (10.7-17.6). No patient had high-grade inflammation. Low correlation was found between SWE and fibrosis ($r = 0.2$; $p=0.09$) as well as between the SWD and fibrosis ($r=0.23$; $p=0.32$). The area under the receiver operating characteristic (AUROC) differentiating F0-1 from F2-4 was 0.62 (95% CI:0.45-0.78). A cut-off SWE of ≤ 4.7 kPa yielded 96% sensitivity and 73% specificity to rule out significant fibrosis (F2-F4).

Conclusion: Clinically uncomplicated grafted livers in a small pediatric cohort revealed slightly increased liver stiffness and dispersion than previously reported in healthy controls. Histologically high-grade fibrosis displayed great variability in stiffness values but without significant difference to low-grade fibrosis.

Liver MR and US elastography correlation to 4D flow and lymphatic stasis in pediatric Fontan circulation

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Charlotte de Lange^{1,2}, Staffan Gustafsson^{2,3}, Britt Marie Ekman-Joelsson^{2,3}, Jan Sunnegårdh^{2,3}, Mats Synnergren^{2,4}, Pär Arne Svensson¹, Hanna Hebelka^{1,2}, Kerstin Lagerstrand^{2,5}, Frida Dangardt^{2,3}

1. Dept. of Pediatric Radiology, Queen Silvia Childrens' Hospital
2. Institute of Clinical Science, Sahlgrenska Academy, University of Gothenburg,
3. Dept. of Pediatric Cardiology, Pediatric Heart center, Queen Silvia Childrens' Hospital,
4. Dept of Cardiovascular and thoracic surgery , Pediatric Heart center, Queen Silvia Childrens' Hospital,
5. Dept of Medical Physics, Sahlgrenska University Hospital.

Background: Patients with Fontan circulation have increased central venous pressure and lymphatic obstruction leading to Fontan associated liver disease. Non-invasive assessment of development of fibrosis is difficult due to confounding inherent congestion.

Purpose: Can Magnetic resonance elastography (MRE), ultrasound shear-wave elastography (SWE), ultrasound shear-wave dispersion (SWD) and MR relaxometry be used in assessing liver fibrosis and congestion in pediatric patients? Is degree of lymphatic stasis related to liver stiffness?

Methods: Thirteen pediatric patients with Fontan circulation admitted for annual cardiac follow up, were prospectively included. Hepatic and cardiac MR including cardiac function, 4D flow, lymphography, T1- and T2 mapping and MRE, as well as hepatic SWE and SWD were performed. MR lymphatic stasis pattern was classified in 4 groups (class 1=no stasis up to class 4=severe stasis).

Statistical analysis for correlations between elastography, flow, relaxometry and cardiac function were performed.

Results: 3T MRI and ultrasound were performed in 13 patients, median age 14 years (range 3-18), 9 males (64%). MR lymphography (n=12) revealed class 2 in 2 patients and class 3-4 in 10 patients.

Liver stiffness was increased, MRE 5.0 ± 1.9 kPa, SWE 17.3 ± 9.9 kPa, as well as liver viscosity (SWD) 15.9 ± 3.9 m/s Khz, and hepatic T1 times 898 ± 106 ms and T2 times 46.7 ± 8.3 ms, as compared to previously reported adult and pediatric normal values.

MRE was correlated to flow in Fontan circuit, 4.9 ± 2.2 L/min (R 0.7-0.8, $p=0.02-0.03$) but not to SWD or T1 and T2 times (R 0.1-0.3, $p=0.4-0.8$). SWE correlated to MRE and SWD, both R

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



0.7, $p=0.01$. MRE and SWE showed no correlation to lymphatic stasis ($R\ 0.3$, $p=0.4$), nor to cardiac function, endiastolic volume index $95 \pm 23\text{ ml/m}^2$ and ejection fraction $52 \pm 10\%$ ($R\ 0.1$ - -0.3 $p=0.06$ - 0.9).

Conclusion: This pilot study revealed increased liver stiffness (MRE, SWE), viscosity (SWD) and relaxometry values in children with Fontan circulation. MRE seems to relate to flow in Fontan circuit but not to cardiac function or degree of lymphatic stasis. Neither MR relaxometry nor SWD, a potential marker of oedema/congestion, were associated with lymphatic stasis in this small cohort.

Liver shear wave elastography and portal venous doppler estimation before and after meal in pediatric patients with diffuse liver disease

Tijana Radovic^{1,2}, Ivana Dasic¹, Sofija Cvejic¹, Nina Ristic^{2,3}, Ivan Milovanovic^{2,3}, Milica Radusinovic³, Irena Djoric³, Zoran Lekovic^{2,3}, Polina Pavicevic^{1,2}

1. University Children's Hospital Belgrade, Department of Radiology

2. University of Belgrade, Faculty of Medicine

3. University Children's Hospital Belgrade, Department of Gastroenterology and Hepatology

Background: Liver stiffness (LS) is increasingly used in the non-invasive evaluation of chronic liver diseases in pediatric patients of all age. It correlates with hepatic venous pressure gradient in patients with high grade fibrosis and cirrhosis and holds prognostic value in this population. Hence, accuracy in its measurement is needed. Several factors independent of fibrosis influence liver stiffness. However, the information on whether meal ingestion modifies liver stiffness in fibrosis and cirrhosis in pediatric patients with diffuse liver disease are highly lacking.

We aimed to evaluate the effect of meal intake on liver stiffness in pediatric patients with diffuse liver disease with or without fibrosis/cirrhosis as confirmed by biopsy.

Methods: We investigated 10 pediatric patients after an overnight fast (8 male, mean age 12.9 ± 3.66 yrs.- 3 with autoimmune hepatitis, 1 with juvenile polycystic kidney disease and

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

hepatic fibrosis, 3 with idiopathic portal vein thrombosis and cavernous transformation, 2 with alfa 1 antitrypsin deficit and 1 with cystic fibrosis) of which five had liver fibrosis stage F2 and higher and five had normal biopsy results. Liver stiffness (point shear-wave elastography) and portal blood flow (PBF- Doppler-Ultrasound) were measured before and 45 minutes after receiving a mixed meal.

Results: Mean LS value before meal was 9.06 ± 6.68 kPa, while mean post-prandial value was 7.81 ± 5.32 kPa, with significant correlation between two values ($r=0.99$, $p<0.001$) and highly significant difference as estimated by paired t-test ($p=0.026$). Mean LS value before meal in group of patients with fibrosis was 13.5 ± 7.11 kPa and in patients without fibrosis 4.6 ± 0.76 kPa, post-prandially 11.12 ± 6.01 kPa vs 4.5 ± 0.21 kPa respectively, with highly significant difference in LS between groups ($p=0.001$ and $p=0.04$). Mean PBF value before meal was 20.84 ± 7.06 cm/s and after meal was 26.48 ± 10.19 cm/s, with significant difference in blood flow in pre and post-prandial phase ($p=0.036$). Reverse correlation of delta in values before and after meal in LS and PBF was moderate ($r=-0.564$) and showed no statistical significance ($p=0.09$).

Conclusion: The results of the present study represent the confounding effect of a meal on the accuracy of LS measurements for the prediction of fibrosis stage and its decrease in values in paediatric patients with diffuse liver disease.

Quantified Motility MR Enterography Response Assessment in Paediatric Inflammatory Bowel Disease

R Meshaka¹, H Fitzke¹, A Menys¹, K Jones¹, K Rupasinghe¹, J Barber¹, T Watson¹

1. Great Ormond Street Hospital for Children

Background: Small bowel disease response assessment using MR enterography (MRE) in paediatric inflammatory bowel disease (PIBD) is subjective. Scoring systems, such as Simplified Magnetic Resonance Index of Activity (sMaRIA), can be time consuming and not used in routine practice.

Quantified bowel motility using cine MRE correlates with histopathology at the terminal ileum (TI) and increases after 6-weeks of biologic therapy in small paediatric cohorts, making it a

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

potential objective biomarker. It is unknown if motility score can reliably detect response in clinical cohorts.

Methods: This study was approved by local ethics committee (REC 10-H0-720-91). A single centre, retrospective search included all patients <18 years with PIBD and >1MRE between 2012-2022. The cine images from each patient's first two MREs were processed using FDA approved GIQuant®. Two paediatric radiology consultants provided sMaRIA and motility scores (arbitrary units) at TI + worst affected segment (if not TI). Radiological response was defined by a decrease in sMaRIA of ≥ 2 . Clinical response was determined by a paediatric gastroenterologist's physician's global assessment (PGA).

Changes in motility score were compared in clinical and radiological responders versus non-responders (unpaired Mann Whitney).

Results: There were 64 patients (33 male) aged 5-16: 21/64 (33%) responders, 37/64 (58%) non-responders, 6/64 (9%) no active disease based on PGA; 8/64 (12%) responders, 42/64 (66%) non-responders, 13/64 (20%) no active disease based on sMaRIA with 1 exclusion (complex ileostomy case with surgical complications). Expert consensus using sMaRIA showed limited agreement with clinical assessment of up to 65%.

The motility score at the most severe segment increased in clinical responders versus non-responders: median +27 versus -42 ($p=0.058$, 0.009 for 2 readers). This was particularly true for non-TI segments: median +145 compared to -16 ($p=0.01$ and 0.0002).

There was numerical, but no significant difference in motility score change in responders versus non-responders classified radiologically by sMaRIA: median +35 compared to -19 for responders and non-responders, respectively ($p=0.14$ and 0.19).

Conclusion:

In this relatively large clinical PIBD cohort, increasing motility corresponded to clinical response. Quantified motility may be more useful than traditional scoring systems in PIBD.

Hepato-renal index on ultrasound in overweight children as non-invasive quantitative imaging biomarker

Virginie Frings¹, Judith Lubrecht¹, Kylie Karnebeek¹, Vera B. Schrauwen-Hinderling², Simon G.F. Robben³, Anita C.E. Vreudenhil¹

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

1. Department of Pediatrics, Centre for Overweight Adolescent and Children's Healthcare, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands;
2. Department of Imaging / Nutrition and Movement Sciences NUTRIM School of Nutrition and Translational Research in Metabolism Faculty of Health, Medicine and Life Sciences, 6229 ER Maastricht University, Maastricht, The Netherlands
3. Department of Radiology, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands

Background: Fatty liver disease is present in around 8% of children and increases up to 38% in children with obesity. Hepato-renal index (HRI) on ultrasound is a non-invasive and quantitative imaging biomarker which could detect and monitor non-alcoholic fatty liver disease (NAFLD) in children. In this study we analyzed HRI in children with overweight or obesity.

Methods: This prospective clinical monocenter study included patients <18 years old with overweight or obesity. Weight, height and age were recorded. Ultrasound of the liver, with liver and kidney in one field of view, were analyzed to calculate HRI. A region of interest (ROI) of 908 pixels was placed in liver parenchyma without large blood vessels and was compared to an identical sized ROI in kidney cortex. The average of three measurements was taken as definite HRI. Magnetic resonance imaging (MRI) of liver was performed to determine liver steatosis and to exclude hepatic comorbidities.

Results: Twenty-one patients were included of which 15 patients had increased ALT of more than two times the upper limit of normal (>44 U/L for girls and >52 U/L for boys) plus liver steatosis on MRI. Median age was 15 year (IQR 12-15) and patients had a median BMI of 31.1 kg/m² (IQR 28.5-37.1), with a corresponding median BMI z-score of 3.4 (IQR 3.1-4.0). HRI was significantly higher in patients with increased ALT and liver steatosis on MRI with a mean HRI of 2.2, compared to unaffected patients with a mean HRI of 1.3 (p=0.02). Receiver operating characteristic curve showed an area under the curve of 0.92 to detect NAFLD with HRI with an optimal cut-off of 1.5 with a sensitivity of 93% and specificity of 83%.

Conclusions: HRI is significantly increased in patients with increased ALT and liver steatosis on MRI and could serve as non-invasive quantitative imaging biomarker in children with overweight or obesity to detect fatty liver disease. An optimal HRI cut-off value of 1.5 had a good sensitivity and specificity of 93% and 83% respectively.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Ultrasound shear-wave elastography and attenuation imaging compared to histology in pediatric patients

M. Zellner¹, R. Gnannt¹, I. Altmann-Schneider¹, V. Spyropoulou², D. Lenggenhager³, C. J. Kellenberger¹

1. University Children's Hospital Zurich, Radiology, Zürich, Switzerland,
2. University Children's Hospital Zurich, Gastroenterology, Zurich, Switzerland
3. University Hospital Zurich, Pathology, Zurich, Switzerland

Purpose: To gain experience with and evaluate the role of quantitative liver ultrasound for characterization of liver disease in children.

Material and Methods: In this ongoing study, shear wave elastography (kPa), shear wave dispersion slope [(m/s)/kHz] and attenuation imaging (dB/cm/MHz) measured with an 8MHz matrix convex array transducer (Aplio i800, Canon Medical System) are compared to clinically indicated liver biopsy. Since December 2021, quantitative US data have been compared to histology reports in 15 children (age 12.2 +/- 2.8 years, range 6.7 years to 16.7 years) with descriptive statistics.

Results: 13 out of 15 children with portal inflammation in liver biopsy showed an elevated dispersion slope above 12.5 [(m/s)/kHz]. 5 patients had increased attenuation (> 0.63 dB/cm/MHz) correlating to steatosis seen in the liver biopsy in 3 out of 5 children. One patient showed a steatohepatitis with increased attenuation (0.79 dB/cm/MHz) and dispersion (13 [(m/s)/kHz]). 6 children with elevated shear wave elastography showed either fibrosis or cirrhosis.

Conclusion: These preliminary data show that quantitative US imaging of the liver may predict inflammation, steatosis and fibrosis on histology of the liver. Further study is needed also for defining normal values of quantitative liver imaging in the pediatric population.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Is ASL MRI the new tool for reliable renal perfusion quantification? Study of quality and reliability of repeated measurements**

Tijana Radovic^{1,2}, Milica M. Jankovic³, Mirjana Kostic², Brankica Spasojevic², Mirjana Cvetkovic², Ivana Gojkovic⁴, Polina Pavicevic^{1,2}

1. University Children's Hospital, Department of Radiology, Belgrade, Serbia
2. University of Belgrade, Faculty of Medicine, Belgrade, Serbia
3. University of Belgrade, School of Electrical Engineering, Department of Signals and Systems, Belgrade, Serbia
4. University Children's Hospital, Department of Nephrology, Dialysis and Transplantation, Belgrade, Serbia

Background: Measurement of renal perfusion is a crucial part of measuring kidney function since it represents a key determinant of glomerular filtration rate. Arterial spin labelling magnetic resonance imaging (ASL MRI) is a non-invasive method of measuring renal perfusion using arterial blood as endogenous contrast without the need for administration of exogenous compounds. Aim of our study was to determine the quality of perfusion measurements as well as the intra-visit and inter-visit reproducibility of ASL MRI method for perfusion estimation in pediatric and young adult renal allograft patients and individually matched healthy controls.

Methods: Renal perfusion exams were performed at 1.5Tesla MRI in a total of 40 subjects: 20 allograft patients (10 male, median age 15.5yrs.) for intra-visit reliability and 20 individually matched healthy controls for intra-visit measurements and inter-visit reproducibility on a separate day with at least 24h apart. Reliability of repeated measurements was estimated with intraclass correlation coefficient (ICC) and coefficient of variance (CV). To allow for quality assessment, relative perfusion-weighted signal (PWS) of parametric maps was calculated.

Results: Mean PWS value on parametric maps was $3.43 \pm 1.43\%$, with no significant difference between study groups ($p=0.101$). cRBF in the patient group ranged between 85 and 335 mL/100 g/min, with a mean value of 190.05 ± 67.62 mL/100 g/min, while in the control group the mean cRBF value was 322.00 ± 121.36 mL/100gr/min. In addition, in allograft group, cRBF values of the whole kidney measured in all obtained slices (8) were compared to a single representative middle slice and the acquired results showed a highly significant correlation between the two values ($r=0.82$, $p=0.00004$) with no statistically significant difference in two

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



different quantification approaches (whole kidney vs single representative slice mean values 173.78 ± 53.29 and 183 ± 61.66 ml/min/100gr, respectively, $p=0.319$) Overall intra-visit ICC varied between 0.91-0.99, while CV was 5.7%. while inter-visit measurements in healthy participants demonstrated slightly more variation with ICC of 0.86 (0.68-0.94) and CV of 13.4%.

Conclusion: ASL MRI at 1.5T provides a repeatable method of measuring renal perfusion in both allograft patients and healthy subjects without the need for administration of exogenous compounds.

Ovarian Torsion: Challenges in Sonographic-Surgical discordance

Anna Seehofnerova^{1,2}, Jayne Seekins¹, Stephanie Cizek³, Erika Rubesova¹

1. Department of Radiology, Stanford School of Medicine

2. Masaryk University Brno

3. Department of Obstetrics & Gynecology, Stanford School of Medicine

Objective: Adnexal torsion is one of the most common gynecological emergencies. It is caused by twisting of the ovarian vasculature due to anatomic differences such as longer uteroovarian ligament or secondary to an ovarian mass. Ultrasound is the modality of choice to detect torsion although definitive diagnosis is difficult despite various signs that have been described in the literature. The aim of our study was to evaluate patients with sonographic-surgical discordance and reasons for the discrepancy.

Materials & Methods: We retrospectively evaluated ultrasound examinations of patients (0-18yo) referred to our institution with suspicion of adnexal torsion between 2018 and 2023. From 1328 patients with pelvic ultrasound, we reviewed 41 cases with sonographic diagnosis of torsion, based on asymmetrical ovarian enlargement, stromal edema with peripheralization of follicles, decreased perfusion, or whirlpool sign. Presence of ovarian masses (solid or cystic) or other anomalies was recorded. Final diagnosis was based on surgical report, MRI, or clinical examination. Additionally, 9 cases with negative ultrasound had torsion diagnosed by MRI or surgically.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Results: 25/41 cases with sonographic diagnosis of torsion were confirmed intraoperatively. In the false positive group (16/41), the majority of ultrasounds (12/16) were remarkable for the presence of an adnexal mass noted in surgery or MRI, which was not described by ultrasound in 8 cases due to small size, central position in the parenchyma, isoechogenicity, or lack of perfusion, and therefore demonstrating features of torsion.

8/9 patients with false negative sonographic diagnoses presented with large adnexal masses (>5 cm). One patient from this group had no adnexal mass, but symmetrical enlargement of ovaries was noted, without other signs of torsion. Torsion on the right side was proven intraoperatively.

Conclusion: Despite being the modality of choice for ovarian torsion detection, ultrasound diagnosis can be challenging. The presence of adnexal mass is a major obscuring factor. Patients with concomitant ovarian mass should be evaluated for additional sonographic findings of torsion such as whirlpool sign, and eventual imaging with MRI. Although ultrasound provides useful information, clinical symptoms should prevail for surgical decision-making.

Antibiotic Prophylaxis for Micturating Cystourethrography: Findings from a National Multidisciplinary Survey

Harsimran Laidlow-Singh¹, Kate Thomas², Susan C Shelmerdine³

1. Paediatric Radiology, Evelina London Children's Hospital, London UK
2. Department of Radiology, Royal Hospital for Children & Young People, Edinburgh UK
3. Great Ormond Street Hospital for Children, London UK

Background: Paediatric patients are referred to radiology departments for micturating cystourethrogram (MCUG) studies for a variety of reasons, usually in the investigation of recurrent/atypical urinary tract infection (UTI) or congenital anatomical abnormalities, such as posterior urethral valves. Due to risk of introducing exogenous infection, this procedure is performed with antibiotic cover, for which there is a robust evidence base, as well as national and local guidance. This study is designed to identify and characterise variations in practice between individuals and institutions across the United Kingdom.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Materials and Methods: Prospective multi-centre survey designed to capture behaviour and experience of multiple stakeholder professional groups including radiologists, radiographers, paediatric surgeons, and primary care doctors. Questions ascertaining knowledge and application of current best practice.

Results: Knowledge of best practice for antibiotic use in MCUG studies is significantly varied amongst UK medical professionals, with variations correlating with professional group and region of practice. Not all paediatric patients are routinely given evidence based treatment for this investigation.

Conclusion: There is a wide variation in clinical practice regarding the provision of antibiotics for MCUG studies including in prescribing, dispensing, and checking. A risk of patient harm arises from both underutilisation of antibiotics, in the form of higher rates of ascending UTI, and overutilisation, in the form of antibiotic related side effects and microbial resistance. Inappropriate practice also worsens resource efficiency by resulting in delayed and cancelled studies. Variation in practice should be minimised, initially by employment of robust local and national policy.

Comparison of superb microvascular imaging with Color and Power Doppler imaging in the evaluation of testicular vascularity with Doppler Ultrasound for determination of viability in undescended testes in children

Mustafa Faraşat¹, Mine Özkol Önoğlu¹

1. Turkish Society of Radiology European Society of Radiology

Purpose/Objective/Background: Evaluation of blood supply of undescended testicles (UT) and small-sized testicles is not always possible with traditional Doppler techniques. Superb Microvascular Imaging (SMI) is a new Doppler Ultrasound technique used to determine low velocity blood flow. SMI is available in two modes as color SMI (cSMI) and monochrome SMI (mSMI). In our study, we aimed to evaluate the effectiveness of SMI in demonstrating testicular blood flow and compare it with color Doppler (CD), power Doppler (PD) and Advanced Dynamic Flow (ADF).

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Materials: Pediatric patients who applied for testicular ultrasound for any reason were evaluated in the study. Patients with hydrocele, testicular mass, inguinal and femoral hernia, and patients who could not be examined due to non-compliance were excluded from the study. 71 patients, 138 testicles were included in the study.

Methods: CD, PD, ADF, cSMI and mSMI Doppler images were obtained from the testicular hilum level. Visual scoring was used for blood flow assessment. Testicular borders were drawn manually on PD, ADF, cSMI and mSMI images and the vascularity index (VI) was calculated automatically by the ultrasound device. Patients were divided into 4 groups (0-12, 13-60, 61-120, 121-206 months) according to age, and ROC curve analysis was used to determine the normal testicular VI cut-off value.

Results: The mean age of the patients was 66 months (1-206 months). Of 138 testicles, 72 were intrascrotal, 63 were inguinal, and 3 were abdominal. The longest size and volume of ITs were smaller than normal testicles (NT), the difference was statistically significant ($p < 0.05$). In visual scoring, testicular blood flow detection rates were 50.7%, 76.1%, 70.3%, 94.9%, 95.7% in CD, PD, ADF, cSMI, mSMI, respectively. There was good agreement between the two readers in visual scoring ($\kappa = 71, 68, 79, 75, 76$). Mean VI values in NTs and ITs, respectively, were PDVI 4.76 ± 4.03 - 1.66 ± 2.02 , ADFVI 1.57 ± 1.34 - 0.92 ± 1.52 , cSMIVI 3.04 ± 2.12 - 1.45 ± 1.32 and mSMIVI 5.04 ± 3.46 - 2.51 ± 2.32 , the difference was statistically significant ($p < 0.05$). mSMIVI cut-off value (sensitivity, specificity, and area under the curve) in groups 2, 3, and 4 were 1.85 (80%, 50%, 0.694), 2.4 (80%, 65%, 0.722), 3.75 (81%, 78%, 0.889) respectively. cSMIVI cut-off value in groups 1, 3, and 4 were 1.35 (87%, 58%, 0.714), 1.6 (75%, 59%, 0.704), 1, 4 (90%, 78%, 0.910). PDVI cut-off value in groups 1, 2 and 4 were 2.25 (81%, 65%, 0.750), 1.4 (80%, 58%, 0.781), 1.4 (95%, 78%, 0.942). ADFVI cut-off value in group 4 was 0.35 (100%, 78%, 0.910).

Conclusions: SMI is more sensitive than other Doppler techniques in detecting testicular blood flow, and we think that it should be a part of routine testicular vascular examination, especially in cases where blood flow is difficult to detect, such as in undescended testis. Studies with larger patient populations are needed for the accuracy of VI cut-off values.

Keywords: Color and power Doppler, Superb microvascular imaging, Undescended Testis, vascularity index

An optimised diagnostic imaging pathway for suspected renovascular hypertension in children

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Rita Pina Prata¹, Dipalee Durve²

1. Rita Pina Prata - Radiology Department, Centro Hospitalar Universitário Lisboa Central; ESOR Fellow at Evelina London Children's Hospital
2. Dipalee Durve MRCPCH FRCR Consultant Paediatric Radiologist, Evelina London Children's Hospital

Purpose: Paediatric hypertension in children is increasing in prevalence and if untreated can lead to cardiovascular or end stage renal disease. A clear pathway that guides clinicians to select appropriate investigations is recommended. The authors propose a refined diagnostic imaging algorithm to image children with hypertension.

Methods: An algorithm was proposed using a literature review and our experience at the Evelina London Children's Hospital: Following a dedicated clinical assessment, B-mode ultrasound (MBUS) is suggested as a first-line approach unless there is a high clinical suspicion of renovascular disease, whereby they proceed directly to renal Doppler ultrasound (RDUS). MBUS aims to assess renal artery stenosis, aortic calibre, renal vein patency, renal length discrepancy or other causes of hypertension such chronic renal disease or a renal/suprarenal mass. RDUS assessment is recommended in patients with a high index of suspicion (as per ESPR Abdominal Imaging Task Force definitions) and in cases with a positive MBUS. Further imaging is performed accordingly and is included in the suggested algorithm.

Materials: The proposed algorithm was retrospectively tested on a database of 85 patients who were referred to a tertiary paediatric centre with hypertension.

Results: Seventy-five out of the patients underwent MBUS and 57 (67%) underwent RDUS. MBUS was considered positive in 6 out of 9 patients with confirmed renovascular hypertension, representing a sensitivity of 67% (and specificity of 82%). RDUS was performed on 57 patients attaining a sensitivity of 67% and specificity of 82%. Using the suggested algorithm, only 33/85 (39%) of RDUS would have been performed instead (25 due to high clinical suspicion and 8 with B-mode ultrasound) and RDUS evaluation would not have been omitted in any patient. Appropriate selective advanced imaging assessment of the renal arteries was performed including 7 patients who underwent magnetic resonance or computed tomography angiography and 11 who underwent angiography.

Conclusion: In high risk patients for renovascular hypertension RDUS may be the appropriate initial test and may direct further work-up. However, MBUS may be sufficient in many patients

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

with hypertension and may provide alternative diagnosis. Adequate patient selection would represent a decrease of 28% of RDUS performed.

Friday 9th 13:30h-15h

MSK and AI Session

Role of T2-weighted MR radiomics in the prediction of FOXO1 fusion-positive rhabdomyosarcoma

Adarsh Ghosh¹, Hailong Li¹, Alexander J. Towbin¹, Brian K. Turpin¹, Andrew T. Trout¹

1. Cincinnati Children's Hospital Medical Center

Objectives: Alveolar rhabdomyosarcomas are often associated with chromosomal translocations, which result in fusions of PAX3-FOXO1&PAX7-FOXO1. FOXO1-fusion is a significant negative prognostic factor in patients with localized disease, with an overall survival of 65% versus 88% for fusion-negative rhabdomyosarcomas. Unfortunately, molecular testing for the evaluation of FOXO1 fusion is time-consuming and is not available at the time of histological diagnosis.

Radiomics is a quantitative approach to imaging that extracts features from the image pixels. Studies in other tumours have shown that radiomic features can differentiate tumour subtypes. The purpose of this study is to evaluate the ability of T2-weighted MR radiomics to predict FOXO1 fusion-positive paediatric rhabdomyosarcoma.

Methods: Patients with rhabdomyosarcoma and baseline MR imaging were retrospectively identified. Radiomics models were developed using a training cohort and tested in a separate cohort with the same diagnosis. Whole tumour volumes-of-interest (VOIs) were segmented on T2-weighted images by a single reviewer. For each VOI, first-order histogram and second order radiomics features were extracted. Maximum relevance and minimum redundancy algorithm were applied for feature selection. Logistic regression and support vector machine (SVM) were employed as the classifiers. Receiver operating characteristic (ROC) analysis was performed to evaluate the diagnostic performance of the classifiers on the test set.

Results: A total of 68 patients were included in the study. The radiomics model was developed in 52 subjects (median age (IQR) of 7 years (2 -14years); 34 females, 21 FOXO1-fusion

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





positive) and tested in 16 patients (median age (IQR) of 4 years (2 -13years); 6 females, 4 FOXO1 fusion positive). The logistic regression and SVM models showed AUCs of 0.95 (95% CI: 0.89-1.0) and 0.96 (0.91-1.0) respectively on the training cohort. On the test cohort, the logistic regression model achieved an AUC of 0.83 (95% CI: 0.62-1.0) with a sensitivity of 83% (95% CI: 52-98%) and specificity of 100% (95% CI: 40-100%). The SVM model obtained similar performance on the external test set with an AUC of 0.83 (95% CI: 0.62-1.0).

Conclusion: T2-weighted MRI radiomics features can predict FOXO1-fusion in paediatric rhabdomyosarcomas. Future studies are needed to test the model on larger datasets and improve its performance.

Paediatric bone age estimation from lateral elbow radiographs using a machine learning-mediated approach

Alcide Alessandro Azzena¹, D. U. Pizzagalli², F. Del Grande^{1,2}, S. M. R. Rizzo^{1,2}, M. Wyttenbach¹, M. B. Cipullo¹, S. Ghielmetti¹, M. C. Lacalamita¹, M. Palermo¹, S. Presilla³, L. Bellesi³

1. Istituto Imaging della Svizzera Italiana (IIMSI), Ente Ospedaliero Cantonale (EOC), Radiology, Lugano, Switzerland,
2. Università della Svizzera italiana (USI), Facoltà di scienze biomediche, Lugano, Switzerland,
3. Istituto Imaging della Svizzera Italiana (IIMSI), Ente Ospedaliero Cantonale (EOC), Servizio di Fisica Medica, Lugano, Switzerland

Purpose: To develop a machine learning-mediated approach to compute bone age from the lateral elbow radiograph in paediatric patients

Methods and Materials: Two-projections radiographs of the left elbow from 2013 to 2020 from 4 different hospitals were analyzed by five experienced radiologists who assigned bone age scores according to the Sauvegrain method (using two projections) and the Dimeglio method (using only the lateral projection). For both methods, the Olecranon Apophysis Score (OAS) was computed. This annotated dataset was used to train a machine learning-based system that computes OAS by solving a regression problem. Then, OAS was mapped to bone

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

age using a polynomial interpolation of the curve presented in the Dimeglio method, tailored for girls and boys. A separate dataset, including the standard projections of the left elbow performed for bone age estimation in 2021, was selected to validate the system. For this dataset, five reviewers scored the images using the Sauvegrain and Dimeglio method with the highest agreement to estimate bone age. To evaluate the accuracy of this dataset, the mean absolute error with respect to the manually annotated OAS and bone age was computed. The machine-learning approach was applied also to the validation dataset.

Results: The machine learning-mediated estimation of OAS showed a mean difference of 0.43 \pm 0.17 points, compared to the OAS of the radiologist. This corresponded to a mean difference of 4 months compared to the Dimeglio method applied manually and 4.7 months compared to the Sauvegrain method.

Conclusion: The proposed machine learning-mediated determination of bone age was able to assign bone age with a negligible difference compared to the radiologists, thus helping to disambiguate cases not precisely falling into a pre-defined category.

Fully automated measurement of Cobb angle in coronal plane spine radiographs

Christoph Salzlechner^{3,#}, Christopher Lepenik³, Kenneth Chen^{1,2}, Daniel Ehinger³, Thomas Klestil^{1,2}, Stefan Nehrer², Richard Ljuhar³

1. Department for Orthopedics and Traumatology, Landeskrankenhaus Baden-Mödling, Austria
2. Department for Health Sciences, Medicine and Research, University for Continuing Education Krems, Austria
3. ImageBiopsy Lab, Vienna, Austria

correspondence: c.salzlechner@imagebiopsy.com

Keywords: Adolescent idiopathic scoliosis, Cobb angle, spinal deformity, radiographs, artificial intelligence

Objective: Adolescent idiopathic scoliosis (AIS) is the most common form of scoliosis. It is a three-dimensional structural deformity with lateral and rotated curvature of the spine affecting adolescents from 10 to 16 years of age. The current standard method to assess scoliosis is the measurement of lateral curvature of the spine using the Cobb angle in coronal plane

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

radiographs. The interobserver variability for Cobb angle measurements ranges up to 8°. The purpose of this study was to test and validate the fully automated measurement of Cobb angles of an artificial intelligence (AI) model that was trained on more than 17,000 images.

Methods: Cobb angle measurements were performed on 44 AP/PA full spine radiographs of 44 patients with scoliosis (age: 17.3 ± 9.5 years [10, 58]; 29 female, 15 male). Images originated from four different radiography systems of three different manufacturers. A reference standard was established by determining valid spinal curvatures based on matching Cobb angle end vertebrae performed by four radiologists with more than five years of expertise in the measurement of quantitative spinal alignment parameters on AP/PA full spine radiographs. For valid curvatures, the reference standard was defined as the median of the reader measurements. Independently, an AI-based software (IB Lab SQUIRREL) also performed Cobb angle measurements on the radiographs. AI performance was assessed by the mean difference and standard deviation of the differences compared to the reference standard, as well as the ICC.

Results: Based on the Cobb angle end vertebrae selection of the readers, 48 curvatures remained for the reference standard. After comparing the end vertebrae of these curvatures to the AI outputs, 38 valid curvatures remained for performance assessment, corresponding to an accuracy of 79%. The mean difference and standard deviation of differences of Cobb angle measurements between the reference standard and the AI amounted to $-0.32^\circ \pm 4.75^\circ$, showing very low absolute bias. The ICC between the readers amounted to 0.93, while the ICC between the reference standard and the AI amounted to 0.91.

Conclusion: The AI model showed good results in the determination of end vertebrae and excellent results in automated Cobb angle measurements compared to radiologists and could function as a reliable tool in clinical practice.

Applicability and robustness of an artificial intelligence-based assessment for Greulich and Pyle bone age in a German cohort

Johanna Pape¹, Franz Wolfgang Hirsch¹, Oliver Johannes Deffaa², Matthew D. DiFranco³, Maciej Rosolowski⁴, Daniel Gräfe¹

1. Department of Pediatric Radiology, University Hospital, Leipzig, Germany

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

2. Department of Pediatric Surgery, University Hospital, Leipzig, Germany
3. IB Lab GmbH, Vienna, Austria
4. Institute for Medical Informatics, Statistics and Epidemiology, Leipzig University, Leipzig, Germany

Declaration: Conflict of Interest: Matthew DiFranco is an employee of IB Lab GmbH. The other authors declare no conflicts of interest.

Background: Bone age (BA) determination based on the hand and wrist according to the 70-year-old atlas of Greulich and Pyle (G&P) is still commonly used in many institutions today. A more recently available approach based on artificial intelligence (AI) allows automated estimation of BA according to G&P. AI-based approaches are nevertheless limited for images deviating from standard hand and wrist projections. More generally, whether BA determined by G&P still corresponds to the chronological age (CA) of a contemporary German population is still a matter of debate.

Objective: We aimed to determine the agreement of the AI software BA with a current healthy Leipzig collective. In addition, we sought to assess the reliability of the AI software in a setting with slightly angled X-ray projections.

Materials and methods: The AI software BA was retrospectively estimated in children who had received radiographs of one hand in the posterior-anterior and oblique planes to rule out osseous injuries. The prediction error of BA from CA was determined for each plane, as well as the prediction error of BA between the two planes.

Results: 1254 patients (3 - 16 years, median 10.8 years, 55.7% male) were included. The mean error of BA in posterior-anterior projections to CA was 3.0 (\pm 13.7) months in boys and 1.7 (\pm 13.7) months in girls. Oblique projections had highly similar variation to CA (mean error 3.1, respective 0.3).

Conclusion: The BA, as estimated by the AI software, is very close to the real age of the contemporary German population studied and is thus sufficiently accurate in a clinical context. The software provides robust results even for oblique projections.

Keywords: Children, Chronological Age, Bone age, Greulich Pyle, Artificial Intelligence

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





An initial approach of Artificial intelligence in pediatric brain segmentation and quantification using Magnetic Resonance Imaging

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Kousik Shankar², Robert P Raj³

1. Sri Devaraj Urs Academy of Higher Education and Research Tamka, Kolar, Karnataka-563103, India.

2. SVIAM, Bengaluru, Karnataka, India

3. SP hospital, Parassala, Thiruvananthapuram, kerala, India

Objectives:

- Voxel based analysis of pediatric MRI brain images with segmentation of images into various tissue component and reproducing the data.
- Newer fast technique for reproducing segmented and unsegmented images.
- Quantification of tissues in normal pediatric brain MR images.
- Neural network to build Artificial Intelligence in quantification of segmented and unsegmented images

Material and methods: Multicentric Retrospective and Prospective study of pediatric MRI brain. MR sequence used are 3DT1 or SPGR. Data are collected from different centers and processed for segmentation.

The technology stack consists of MATLAB, Python, MRICroN, SPM, and dcm2niigui.

Technique: All the data set collected from different centers are stored and categorized age-wise. Each case study is processed in different software. Application of SPM and Matlab software to convert NifTi images into unsegmented and segmented Matlab figures. With the help of SPM: estimation and reviewing of results with paired t tests. Quantification of brain tissues done using volumetric tools. Creating each individual brain atlases at different age groups among males and females. Our work focuses on using AI and Deep Learning to segment and quantify paediatric brain MRI. Our Voxel Based Morphometry-based method speeds up manual segmentation, saving time and money. This atlas can be used with existing SOTA methods as a large-scale dataset in the age of Big Data and ML.

Results:

- Deep learning and neural network in creating the smooth workflow of Voxel Based Morphometry.
- Reproduce unsegmented and segmented images in effective and quick method.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



- Application: Identify abnormalities and quantify. As an important biomarker in future drug trials to assess treatment effects. 3D image printing. Software for detecting and quantifying normal and abnormal structures.
- Overall, our method accelerates the laborious and time-consuming segmentation process. Automated interpretation of results using Artificial intelligence.

Preferential involvement of the pelvis and hips along with active sacroiliitis in chronic nonbacterial osteomyelitis

Ercan Ayaz^{1,2}, Adalet Elçin Yıldız³, Ezgi Deniz Batu⁴, Yelda Bilginer⁵, Seza Özen⁶, Üstün Aydıngöz⁷

1. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey

2. Diyarbakır Children's Hospital, Radiology Clinic

3. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey

4. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey

5. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey

6. Department of Pediatric Rheumatology, Hacettepe University School of Medicine, Ankara, Turkey

7. Department of Radiology, Hacettepe University School of Medicine, Ankara, Turkey

Purpose: We aimed in this study to present MRI findings in a single-center cohort of patients with chronic nonbacterial osteomyelitis (CNO).

Methods: Three observers (two musculoskeletal radiologists and a pediatric radiologist) reviewed MRI findings in 74 patients (40 males, 34 females; age at onset, mean, 8.7 years; range, 2–17; age at diagnosis, mean, 10.3 years; range 3–18) with CNO, who were diagnosed with this condition over a period of 15 years. For every patient, sites of active osteitis at any time during the course of disease (at initial diagnosis or later follow-up) were noted. Temporal changes of lesions in response to treatment (or other treatment-related changes such as

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



pamidronate lines) were not within the scope of this study. Active sacroiliitis was defined as bone marrow edema or active osteitis subjacent to the iliac and/or sacral sides of sacroiliac joints.

Results: Whole-body (WB) MRI was performed in all but five patients (69/74; 93%) during the course of the disease; mostly following an initial targeted MRI (97%). A total of 289 targeted MRI (mean, 4.0; range, 1–11) and 168 WB-MRI (mean, 2.4; range, 1–8) were performed on the entire study group. Biopsy was made in 30 patients with sufficient material for histopathological diagnosis in all but one (39%), all consistent with CNO or featuring supporting findings. The most common locations for active osteitis were clustered into seven skeletal locations: 1 = pelvis (excluding sacrum and coccyx) and proximal 1/3 of femora (78%); 2 = sacrum and ilium immediately subjacent to sacroiliac joints (69%; active osteitis denoting “active sacroiliitis” here); 3 = distal legs (including distal 1/2 of tibias and fibulas), ankle or feet (66%); 4 = bones surrounding knees including distal 2/3 of femora and 1/2 of proximal tibias and fibulas (55%); 5 = sternum, clavicles, scapulae and mandible (49%); 6 = upper extremities (47%); and 7 = spine, excluding portions of sacrum subjacent to sacroiliac joints (45%).

Conclusion: Bones at (i.e., sacrum and innominate bones) or around (i.e., proximal femora) pelvis were preferentially involved in our cohort of CNO patients with a marked presence of active sacroiliitis.

Diagnostic performance of an artificial intelligence aid for the detection of pediatric appendicular skeletal fractures

Altmann-Schneider I^{2,3}, Pistorius S^{2,3}, Saladin C^{2,3}, Schäfer D¹, Fischer H¹, Arslan N¹, Kellenberger CJ^{2,3}, Seiler M^{1,2}

1. Pediatric Emergency Department, University Children’s Hospital Zurich, Zurich, Switzerland
2. Children’s Research Center, University Children’s Hospital Zurich, Zurich, Switzerland
3. Department of Diagnostic Imaging, University Children’s Hospital Zurich, Zurich, Switzerland

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Purpose: Artificial intelligence (AI) is a rapidly emerging concept, affecting the daily work of radiologists and clinicians. The development of AI tools for pediatric imaging lags behind that for adult imaging. Pediatric fracture detection is challenging compared to adults as fractures are often subtle or even nonvisible. Additionally, the fracture patterns change with the patient's age. This study aimed to evaluate the diagnostic performance of an AI tool for pediatric fracture detection in the three most common fracture locations of the pediatric appendicular skeleton, namely the forearm, elbow and lower leg.

Materials and Methods: Our study was approved by the institutional review board. From December 2021 backwards, consecutive patients aged 0 to 16 years with suspected fractures and radiographs (frontal and lateral) of either the forearm, elbow or lower leg were included until approximately 1000 patients were reached for each location. All radiographs were read by two pediatric radiologists. BoneView's (Gleamer, Paris, France) diagnostic performance was evaluated using the pediatric radiologists' consensus reports as reference standard. Each long bone was analyzed as separate case.

Results: This study included 966 patients with radiographs of the forearm (mean age 7.9 years, age range 0.5 – 16 years), 1030 patients with radiographs of the elbow (mean age 7.7 years, age range 0.5 – 16 years) and 1000 patients with radiographs of the lower leg (mean age 4.8 years, (age range 0 – 15.5 years).

1111 forearm fractures were detected, of which 59.2% radial fractures and 40.8% ulnar fractures. BoneView sensitivity and specificity was 95.6% and 92.2% for radial fractures and 88.7% and 94.5% for ulnar fractures.

20% of the patients had an elbow fracture. BoneView sensitivity and specificity was 82.3% and 78.3% respectively.

558 lower leg fractures were detected, of which 19.5% fibular and 80.5% tibial fractures. BoneView sensitivity and specificity was 87.5% and 96.3% for fibular fractures and 84.4% and 98.4% for tibial fractures.

Conclusions: The diagnostic performance of BoneView for the automated detection of pediatric extremity fractures is promising for forearm and lower leg fractures. However, before implementation in the clinical routine the AI diagnostic performance needs to be improved especially for elbow fractures.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

ZTE sequences with AI-based image reconstruction for 3D evaluation of the temporomandibular joint and craniofacial bones in children with juvenile idiopathic arthritis

N. Kocher¹, C. Kellenberger¹, M. Zellner¹, R. Kottke¹, S. Sirin¹

1. University Children's Hospital Zurich - Eleonore Foundation, Department of Diagnostic Imaging, Zurich, Switzerland

Purpose: In more than 50% of children with juvenile idiopathic arthritis (JIA) the temporomandibular joint (TMJ) is affected. TMJ arthritis can lead to growth disorders of the mandible, to facial deformities and to malocclusion with misalignment of the teeth. 3D reconstructions of the craniofacial bones are needed to evaluate these complications. MRI is the gold standard in detection of TMJ arthritis. But so far, bone structures are not sufficiently visualized by traditional MRI technology and often additional CT scans were performed to create 3D reconstructions. The aim of this study was to evaluate a novel zero echo time (ZTE) sequence with artificial intelligence (AI) based image reconstruction in the diagnosis of osseous changes in children with JIA.

Methods: 2D and 3D images from ZTE sequences reconstructed with deep learning algorithms, were evaluated by two independent experts for image quality (rated with 0-4 using a 5-point scale), for quantitative measurements and for detection of osseous pathologies of the jaws in comparison to images from established black bone sequences. Additionally, a morphometric 3D analysis of the mandible was conducted.

Materials: 42 patients with JIA underwent an MRI of the temporomandibular joints within a period of seven months. Two patients had to be excluded due to an incomplete examination, thus the scans of 40 patients (29 female, 11 male; age 9.5 +/- 3.7 years) were rated and statistically evaluated.

Results: 21 patients presented with active arthritis and 27 patients with postarthritic changes of the TMJ. No significant differences between ZTE and black bone imaging were found for image quality, quantitative measurement of the length of the ramus of the mandible, and detection of osseous pathologies. The 3D reconstruction and evaluation of the facial bones was successful in all patients, with 3D reconstruction of the ZTE sequences being much easier and faster than 3D reconstruction of black bone sequences.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusions: ZTE sequences employing AI-based image reconstruction allow for excellent visualization of compact bone and 3D rendering of the facial bones. These MR techniques have the potential to fully replace CT scans for assessing facial bone pathology in children with JIA and TMJ arthritis.

Artificial intelligence-based image reconstruction of abdominal MRI in children

Vanda Pocepcova¹, Michael Zellner¹, Christian J. Kellenberger¹

1. University Children's Hospital Zurich

Purpose: To investigate image quality of abdominal magnetic resonance imaging (MRI) with artificial intelligence (AI) based image reconstruction.

Material and methods: In 21 children (mean age 6 years and 9 months, range 1 year and 7 months to 15 years and 10 months) undergoing abdominal MRI, including the lung base, on a 1.5 T scanner, axial T2-weighted and T1-weighted images employing radial k-space filling (PROPELLER) were evaluated for image quality. Signal-to-noise ratio (SNR) and contrast-to-noise ratio (CNR) of the liver and spleen were compared between images obtained by conventional and deep learning (DL) reconstruction methods, and between images obtained by conventional reconstruction in two successive examinations, whereas the latest examinations were acquired with increased imaging matrix and reduced number of excitations (NEX) in order to accelerate scan time. Subjective image quality was assessed by three observers using a 4-point Likert scale.

Results: Both T2-weighted and T1-weighted DL reconstructed images provided significantly higher SNR and CNR (Wilcoxon test, $p < 0.0001$). The T1-weighted images acquired in reduced scan time modus also showed significantly higher SNR (Wilcoxon test, $p < 0.001$) and higher CNR (Wilcoxon test, $p < 0.02$) compared to T1-weighted images from our standard settings. The 'accelerated' T2-weighted images showed equivocal results with moderately higher SNR and CNR ($p < 0.03$) for the spleen and no significant difference in SNR and CNR for the liver parenchyma.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



The images with DL reconstruction showed less noise, reduced blurring of organ borders and sharper delineation of small structures such as subsegmental bronchi, subpleural lung vessels and intrahepatic vessels.

Conclusion: AI-based image reconstruction improves image quality of abdominal MRI with the potential to obtain higher spatial resolution and shorten imaging time.

Whole-Body Diffusion-Weighted Magnetic Resonance Imaging (WB-DW-MRI) in tumoral and Non-tumoral pediatric Bone Marrow Diseases(BMD)

Tatiana Fazecas¹, Flavia Martins Costa¹, Clarissa Canela¹, Marcos Godinho¹

1. Clinica de Diagnostico por Imagem – CDPI, Dasa, Rio de Janeiro

Purpose:

- 1) Identify MR protocol used to analyses bone marrow in WB-DW-MRI owing to detect tumoral and non tumoral pathologies and differential diagnosis.
- 2) Know basic principals of DWI WBMRI and typical lesion appearances and awareness of potential pitfalls.
- 3) Make a pictorial essay of lesions that mimic bone marrow tumoral lesions including conventional MRI sequences , DIXON and DWI and understand the characteristic features which allow discrimination between them and true neoplasms in order to avoid unnecessary additional workup.
- 4) The usefulness of DWI whole-body MR in diagnostic algorithms of tumoral and non-tumoral disorders including differentiate diagnosis as inflammatory, infectious and pseudotumoral conditions.

Methods and materials: Exams were performed in 1.5 (Avanto- Siemens) and 3.0 (Prisma-Siemens)Tesla machines with different protocols according with clinical indications, between January of 2015 from January of 2023 in pediatric patients in clinica de diagnostico por imagem (CDPI) in Rio de janeiro-Brasil.

Results:

Different pathologies were diagnosed:

Oncological (lymphoma, neurofibromatosis, rhabdomyosarcoma, Li-Fraumeni Syndrome)

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Inflammatory (Chronic recurrent multifocal osteomyelitis, Juvenil idiopathic arthritis)

Myopathies (Dermatomyositis)

Infectious (Sars-Covid arthritis, tuberculosis, syphilis)

Hereditary (multiple enchondromatosis, vascular malformation)

Conclusion: WB-DW-MRI is a sensitive method for imaging without ionising radiation that can provide WB coverage with a core protocol of high soft tissue contrast and spatial resolution in a short time, useful in detecting and characterising tumoral and non-tumoral BMD, evaluating their response to therapy and in screening of high-risk cancer patients. It is a reliable alternative to conventional imaging for diagnosis, staging and monitoring skeletal cancer, due to radiation free in follow-up examinations.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Poster Abstracts

Artificial Intelligence

Using AI to improve the ultrasound experience in paediatric patients

Dr Brenna McInerney¹

1. The Grange University Hospital, NHS Wales

Introduction: Ultrasound scans can be a daunting experience for children, especially if they don't know what to expect. Providing personalised leaflets or letters to children about their upcoming scan can help alleviate their fears and anxiety. However, tailoring these letters to different age groups can be a time-consuming and costly process. We aim to explore the potential benefits of using AI to personalise letters about ultrasound scans for children.

Methods: We propose to use AI to generate age-tailored letters about ultrasound scans for children. The system will use natural language processing and machine learning algorithms to generate letters that are tailored to each child's age group. We discuss the potential pros and cons, and hypothesise the benefits of conducting a pilot study to evaluate the effectiveness of these personalised letters in reducing anxiety and improving overall satisfaction with the scan experience for both the clinician and patient.

Conclusion: Using AI to tailor letters about ultrasound scans for children has the potential to improve the overall experience of the scan and reduce anxiety in children. This approach is cost-effective and scalable, making it a valuable addition to paediatric healthcare services. If successful, this project could be expanded to other healthcare settings and patient populations. Further research is needed to explore the effectiveness of this approach in different contexts.

Identification and segmentation of neuroblastoma after chemotherapy with an Artificial Intelligence solution

Diana Veiga-Canuto¹, Leonor Cerdà-Alberich¹, Cinta Sangüesa Nebot¹, Luis Martí Bonmatí¹

1. Grupo de Investigación Biomédica en Imagen, Instituto de Investigación Sanitaria La Fe, Avenida Fernando Abril Martorell, 106 Torre A 7planta, 46026 Valencia, Spain

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Purpose/Objective/Background: To assess the accuracy of a fully automatic nnU-Net CNN algorithm to identify and segment primary neuroblastoma tumors in T2 weighted MR images in children after chemotherapy.

Methods: An international, multicentric, and multivendor imaging repository of patients from different European institutions with neuroblastic tumors was used to validate the performance of a previously trained tool based on the nnU-Net architecture, to identify and delineate primary neuroblastoma tumors after first treatment with chemotherapy.

Materials: A dataset of 535 MR T2/T2* weighted sequences was selected (486 sequences at diagnosis and 49 after chemotherapy). Neuroblastic tumors were automatically segmented using a previously trained nnU-Net architecture. The automatic segmentation masks were manually edited by an expert pediatric radiologist and the DICE Similarity Coefficient, Jaccard index, Hausdorff Distance, AUC ROC and the modified false positive rate and false negative rate were used to compare success (the automatic with the manually edited masks).

Results: The median DICE obtained from the comparison of the automatically obtained masks with the masks resulting after a manual edition after treatment was 0.902, slightly lower compared to the median DICE at diagnosis without chemotherapy (0.999). There was no statistical difference between these results. Most (68%, n=33/49) cases after chemotherapy were successfully segmented by the AI solution, with a DICE>0.8. A 33% (n=16/49) of the cases showed a DICE<0.8, and among them, complete failure was observed in 7 cases (14%, DSC<0.19). The factors that influenced the lower outcomes after chemotherapy were a smaller mean volume and a lower voxel signal intensity of tumors after treatment.

Conclusions: This is the first study to validate an automatic identification and segmentation model for post-chemotherapy neuroblastic tumor with MR. This automatic nnU-Net tool is able to locate and segment neuroblastic tumors on T2/T2* weighted MR images after treatment, with a median DICE after treatment of 0.902.

Evaluations of Compressed SENSE combined with Deep Learning Reconstruction in ACR Phantom and Porcine Spine MR Image

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE

Dong Jwo KIM, RT¹, Eunju Kim, Ph.D.¹, SangWoong Park, RT¹, KyungSeong Lee, RT¹, HongUk Gu, RT¹, Myungju Cho, RT¹

1. Seoul National University Hospital Radiology Eunju Kim, Ph.D.: Health Systems, Philips Korea

Purpose: The artifacts such as pulsation and motion can lead to modulation of the k-space data in Spine MR Image. Fast MR imaging techniques such as parallel imaging and/or compressed sensing can ameliorate the motion-related artifacts, consequently improving image quality. However, high acceleration factor to further reduce scan time can deteriorate image quality with undersampling-related artifacts. Recently, a novel method for integrating artificial intelligence (AI) into compressed SENSE (i.e., compressed sensing + SENSE) reconstruction (CS-SENSE AI) has been introduced for significantly reducing scan time as well as noise artifacts. In this work, we aimed to demonstrate the utility of CS-SENSE AI in spine MRI before translating it into clinical practices.

Methods: All MR examinations were conducted using 3 T MR scanner (Ingenia CX, Philips Healthcare, The Netherlands) with dStream anterior-posterior coil. We first tested CS-SENSE AI reconstruction algorithm in ACR MRI phantom. Imaging parameters for CS-SENSE AI were as follow: TR/TE = 3950/100, FOV = 200 × 200, in-plane resolution = 400 × 400, CS-SENSE factor = 2, acquisition time = 2 min 14 s. The CS-SENSE AI reconstruction algorithm was further evaluated with porcine spine *ex vivo*. The cervical, thoracic, and lumbar regions of *ex vivo* porcine spine was scanned in axial and sagittal directions using the same sequences used for scanning ACR phantom. For qualitative and quantitative evaluations, two radiologists evaluated the image quality in terms of sharpness, presence of artifacts, and SNR on a 5-point Likert scale and compared with the images acquired with conventional MR sequences without accelerations.

Results: In both ACR phantom and *ex vivo* porcine spine scans, CS-SENSE AI reconstructions significantly reduced scan times with comparable image quality obtained with conventional MR sequences without accelerations. Moreover, CS-SENSE AI reconstruction improved the image contrast by removing noise and showed better visualization of spinal cord and vertebrae in porcine spine. The inter-observer agreement ranged from substantial to near perfect.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusion: The CS-SENSE AI reconstruction clearly demonstrated the ability of reducing noise artifacts and provided better image quality at accelerated acquisition time, suggesting that it would be promising technique in spine MRI examination.

Clinical Usefulness of Accelerated Deep Learning-Based MRI in Pediatric Patients with Hand Injury with a splint

Gun Young Kim¹, Hong Wook Gu¹

1. Seoul National University Hospital, Radiology

Purpose: The purpose of this research is to evaluate clinical usefulness of deep learning based TSE(TSE_{DL}) denoising technique for MRI of hand injury pediatric patients wearing a splint before surgery.

Methods: MRI protocol, accelerated the deep learning based TSE (TSE_{DL}) and the standard TSE (TSEs) sequences for axial T2 WI, coronal T1 WI, and coronal T2 WI were scanned for comparison. For the quantitative evaluation, two radio technologist with more than 5 year of experience determined three regions of interest, such as bone, fat, and muscle, to obtain signal intensity, and obtained the standard deviation of noise in four image background to calculate and compare SNR and CNR.

For the qualitative evaluation, five valuation items of SNR, Image Contrast, Sharpness, Artifact, and DIQ were evaluated with a 5 point score. Compared to TSE_{DL} and TSEs.

Materials: MRI examination were performed using a 3.0 Tesla MRI scanner (Magnetom SkyraFit, Siemens Healthcare, Erlangen, Germany) with two sets of 30-channel body coils (Body 30, A 3T Tim coil, Siemens Healthcare GmbH, Germany), and used chicken legs instead of the human and phantom.

Results: Scanning time is reduced by approximately half for the TSE_{DL} compared to TSEs. TSE_{DL} showed significantly better SNR, CNR than TSEs for all sequences ($p < 0.05$). For qualitative analysis, TSE_{DL} are shown to be significantly superior to TSEs for both readers in terms of image quality and diagnostic reliability ($p < 0.05$). In this study, the reliability between evaluators was mostly almost perfectly consistent.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusions: In conclusion, it was found that TSE_{DL} is a clinically very useful test by reducing the scan time and improving the image quality compared to TSEs.

Cardiac

CT image of Eisenmenger syndrome in patient with VSD and PDA - what happens when they grow up

Aleksandar Pavlović¹, Tarik Plojović¹, Bojana Mišković¹, Ksenija Mijović¹, Ljubica Sedlar¹, Katarina Lazarević¹, Dragan Vasin¹, Dragan Mašulović¹

1. Center of Radiology, University Clinical Center of Serbia, Belgrade, Serbia

Background: Congenital anomalies, especially if the symptoms are uncontrolled, can result in specific syndromes in adulthood. Eisenmenger syndrome can occur as a complication of uncorrected high-pressure congenital heart defects with large anatomic shunts.

Methods: We are presenting a case report of a 50-year-old male patient with Down syndrome and confirmed ventricular septal defect (VSD) and patent ductus arteriosus (PDA), as well as severe pulmonary hypertension, complaining of hemoptysis.

Materials: After a chest X-ray in the supine position, which showed an enlarged heart and parahilar consolidation, CT pulmonary angiography was done, followed by an echocardiogram.

Results: CT showed VSD and PDA, while contrast saturation dynamics in heart chambers and large blood vessels revealed a reversal of the shunt resulting in a right-to-left shunt. The right ventricle was larger than the left, with the hypertrophic wall, while there was no contrast medium in the left atrium. A pericardial effusion was also seen.

Diffuse confluent zones of ground-glass opacification were shown in all lung lobes with a basal predominance, with foci of consolidation and a smaller amount of content in the bronchial tree.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

The CT findings demonstrated alveolar hemorrhage as part of the Eisenmenger syndrome. Echocardiogram confirmed our findings.

Conclusions: Congenital heart defects with large anatomic shunts can lead to the Eisenmenger syndrome, presenting with signs of pulmonary arterial hypertension and shunt reversal, which can be clearly confirmed by CT.

Right-sided cervical aortic arch in Loeys–Dietz syndrome

Behnam Shakerian¹, Negin Razavi¹

1. Cardiovascular surgery department, Kashani Hospital, Shahrekord University of Medical Sciences, Shahrekord, Iran

Loeys–Dietz syndrome is an autosomal dominant connective tissue disorder that is characterized by skeletal abnormalities, craniofacial malformations, and predisposition for aortic aneurysm with tortuosity. We report a case of a right-sided cervical aortic arch associated with the Loeys–Dietz syndrome.

Case report: A 13-year-old girl presented complaining of a pulsatile mass on the right side of her neck since birth, which had gradually increased in size. On physical examination, she had a short stature, there was a pulsatile swelling on the right side of the neck. Cardiac examination was normal. Examination of her head and face revealed an abnormal cranial structure consistent with hypertelorism, retrognathia, and low-set ears, and inspection of her oral cavity showed a bifid uvula and a high arched palate. Skeleton findings included scoliosis and joint laxity. Chest X-ray showed the absence of a normal aortic knob. Computed tomography angiography revealed a right-sided cervical aortic arch. The patient underwent surgical reconstruction.

Discussion: In 2005, Loeys et al. characterized a newly identified genetic syndrome by a triad of hypertelorism, cleft palate or bifid uvula, and arterial tortuosity or aneurysm. Other

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

manifestations include blue sclera, scoliosis, retrognathia, craniosynostosis, pectus deformity, joint laxity, velvety skin, congenital heart defect, and mild developmental delay.

A cervical aortic arch is a rare vascular anomaly. The prevalence of a cervical aortic arch is less than 1 in 10,000 live births. The cervical aortic arch is often asymptomatic or presents as a pulsatile neck mass, dysphagia, dyspnea, discrepancy of arterial blood pressure between the upper and lower extremities, cough, hoarseness, and mild stroke.

Myocardial dystrophic calcifications in children: A case series

Karen I. Ramirez-Suarez¹, Monica Miranda-Schaeubinger¹, Joseph A. Stern¹, Mariangeles Medina Perez¹, Jordan Rapp^{1,2}, David Biko^{1,2}, Hansel J. Otero^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, 3401 Civic Center Blvd, Philadelphia, PA, USA.

2. Perelman School of Medicine at The University of Pennsylvania, Philadelphia, PA, USA.

Background: Dystrophic calcification of the myocardium is a rare condition that may develop as a complication of several critical illnesses. The pathophysiology of this condition is poorly understood, and the underlying mechanisms and clinical manifestations may differ between etiologies. Various imaging modalities are used to detect and characterize myocardial calcifications, including chest radiography, echocardiography, CT, and MRI. Our goal is to describe the clinical and imaging findings of eight children with dystrophic myocardial calcifications.

Methods & Materials: In this retrospective study, approved by our Institutional Review Board, we reviewed echocardiography and CT images of children with myocardial calcifications from 2000 to 2022. All CT images were evaluated and compared to echocardiography findings. Clinical information including diagnosis, comorbidities, and treatment was extracted from patients' medical records.

Results: Eight patients, 5 (62.5%) boys, with a median age of 2.9 years [IQR 0.87 - 9.65] were included. All patients had CT imaging and echocardiography. All CT images demonstrated myocardial calcifications, only visualized on echocardiography in three patients (37.5%). The time gap between CT images and echocardiography ranged from 0 to 16 days. Calcification

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

distribution varied from confined to the right ventricle to the entire myocardium. Five patients (62.5%) had a previous cardiac transplant, one of whom also received extracorporeal membrane oxygenation (ECMO). Of the three patients without heart transplant, two patients (25%) had sepsis. One required ECMO and one other (12.5%) had sepsis, liver failure, and required dialysis due to renal failure. The last patient required ECMO after cardiac arrest.

Conclusions: Patients with sepsis, renal failure, ECMO, and heart transplant may develop myocardial calcifications. Calcifications are more likely to be seen with CT than echocardiography. Further research is needed to better understand the pathophysiology of these conditions and how they relate to patient outcomes.

Diagnostic role of cardiac magnetic resonance in children and young adults with structurally normal heart and ventricular arrhythmia

Maja Bijelić¹, Andrija Pavlović¹, Tamara Ilisić¹, Ida Jovanović², Goran Vukomanović¹, Vojislav Parezanović^{1,3}, Igor Stefanović^{1,3}, Jasna Kalanj^{1,3}, Stefan Đorđević⁴, Mirko Topalović⁵, Irena Oštrić Pavlović⁶, Maja Trkulja¹, Marko Pavlović¹, Vlade Živković¹, Milan Đukić^{1,3}

1. Cardiology department, University Children's Hospital, Belgrade, Serbia;
2. BioCell Hospital, Belgrade, Serbia;
3. University of Belgrade, Faculty of Medicine, Belgrade, Serbia;
4. Rheumatology department, University Children's Hospital, Belgrade, Serbia;
5. Department of Pediatric Cardiology, University Medical Centre Children's Hospital Ljubljana, Ljubljana, Slovenia;
6. Clinical allergology and immunology, University Clinical Center of Serbia, Belgrade, Serbia;

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE

Background: Although ventricular arrhythmia (VA) in children and young adults with structurally normal heart is rare, when present, it warrants careful diagnostic evaluation for underlying cardiac disease.

Purpose: Our aim was two-fold: 1) to assess the prevalence of cardiac magnetic resonance (CMR) abnormalities, and 2) to determine independent predictors of CMR abnormalities in children and young adults with structurally normal heart and VA of unknown cause.

Materials: 116 patients (median age 17 years, age range 8 to 44 years) from an electronic registry of a high-volume university center, with VA and normal echocardiographic finding, underwent CMR (1.5 Tesla) with late gadolinium enhancement (LGE) during 2015–2022. Patients with acute myocarditis were excluded.

Methods: Binary logistic regression was used to determine independent predictors of pathological CMR finding.

Results: Abnormal CMR finding was present in 45% (n= 52). In our cohort, 57% (n=66) of patients were asymptomatic. Mean premature ventricular complex (PVC) burden was $18.04 \pm 17.44\%$. Both non-sustained ventricular tachycardia (VT) and sustained VT were present in 17% (n=20), respectively. Strongest predictors associated with CMR abnormalities in univariate analysis were exercise-related symptoms (odds ratio (OR) 3.93, 95% confidence interval (CI): 1.29–11.91, $p=0.015$), PVC burden $>15\%$ (OR 3.40, 95% CI: 1.32–8.7, $p=0.011$) and right ventricle dilation as assessed by echocardiography (OR 1.85, 95% CI: 1.30–19.15, $p=0.027$). After multivariate analysis, exercise-related symptoms (OR 7.83, 95% CI: 1.91–32.09, $p=0.004$) and PVC burden $>15\%$ (OR 4.74, 95% CI: 1.55–14.54, $p=0.006$) remained strongly associated with CMR abnormalities. There was no statistically significant association between abnormal exercise stress test, PVC morphology and CMR findings.

Conclusion: Abnormal CMR findings were present in almost half of our patients, with VA and previously structurally normal heart. Exercise-related symptoms and PVC burden $>15\%$ were significantly associated with abnormal CMR finding.

Cardiovascular magnetic resonance mapping parameters for advanced tissue characterization in hypertrophic cardiomyopathy

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

M. Ibnoukhatib¹, L. Riaza Martin¹, JM. Escudero¹, M. Gonzalo Carballés¹, L. Riera Soler¹, A. Sabate Rotes¹, F. Gran Ipiña¹, E. Vázquez Mendez¹

1. Hospital Vall d'Hebron. Barcelona /ES.

Background/Objective: Hypertrophic cardiomyopathy (HCM) is a myocardial disease transmitted as an autosomal-dominant mutation at high frequency and with a varying clinical presentation. Histological features of HMC include myocyte hypertrophy and interstitial fibrosis. These modifications of extracellular space are correlated to systolic and diastolic dysfunction and prognosis of the patient. Early detection of these changes is important for starting early therapy in patients with a major risk factor for sudden cardiac death.

T1 and T2 mapping is an established cardiovascular magnetic resonance (CMR) technique for quantitative tissue characterization. The clinical relevance of T1 and T2 mapping for risk stratification of HCM has not been confirmed.

The objective of this study is to learn the potential of multiparametric MRI in heart tissue characterisation in patients with HCM and to discuss the future directions of parametric mapping as a prognostic factor.

Methods: We performed a single center retrospective analysis from 2017 to 2023. 36 patients with HCM and 36 healthy patients were enrolled in this study. All subjects underwent cardiac MRI at 1.5 T. Myocardial maps were obtained in the short axis plane at the base, mid-ventricular and apex using single-breath-hold, ECG-triggered and MOLLI sequence. Myocardial segments were categorized as normal (control group), non-hypertrophic (HCM group) and hypertrophic (HCM group). We studied the difference among these three groups of T1 and T2 mapping, ECV, late gadolinium enhancement, and its correlation with left ventricle function and cardiac mass.

Results: Native T1 and T2 values were significantly elevated in both non-hypertrophic and hypertrophic segments of HCM patients compared to controls with significantly higher values in hypertrophic segments. There is also a positive correlation between mapping parameters and positive LGE, left ventricular function and cardiac mass.

Conclusions: CMR mapping parameters in HCM allows comprehensive myocardial tissue characterization and can be used as an integral part in risk stratification. The findings suggest that alteration of mapping parameters occurs earlier than morphological changes and

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

functional alteration. There is also a positive correlation between mappings parameters and cardiac mass.

CLINICAL PARAMETERS OF RESPIRATORY STATUS IN NICUs – IS THERE A ROLE FOR LUNG ULTRASOUND?

Mirjana Petković¹, Jovan Lovrenski¹, Aleksandra Doronjski¹, Slobodan Spasojević¹

1. Institute for Child and Youth Health Care of Vojvodina, Novi Sad, Serbia

OBJECTIVE: To assay the interconnection between LUS and chest X ray (CXR) and clinical parameters of respiratory status (FiO₂, PCO₂ and SaO₂) in prematures. To investigate the possibility of LUS and CXR in detection of subpleural consolidations. To determine whether LUS can be of clinical benefit in assessing the effects of therapy.

MATERIAL AND METHODS: Prospective study included 100 premature neonates who underwent a CXR exam after the admission in the Neonatal intensive care unit (NICU). LUS was performed after admission in each neonate and after each successive CXR. A total of 382 LUS exams were done. Pearson correlation coefficient was used to test the interconnection between LUS and clinical parameters of respiratory status in prematures on mechanical ventilation (MV) and on oxygen therapy (OxTh) – total number of LUSs in patients on MV and OxTh was 277 and 105 respectively. The number of consolidations seen on LUS and CXR was counted and compared between two diagnostic modalities. The p value < 0.05 and the confidence interval (CI) of 95% were considered statistically significant.

RESULTS: Statistically significant correlation (p < 0.001) was established between clinical parameters of respiratory status and LUS both in prematures on MV and OxTh. In prematures on MV the percentage of concurrence of LUS with FiO₂, PCO₂ and SaO₂ was 81%, 80% and 80% respectively, while concurrence of LUS with all three clinical parameters was 68%. In prematures on OxTh, the percentage of concurrence of LUS with FiO₂, PCO₂ and SaO₂ was 94%, 96% and 93% respectively, while concurrence of LUS with all three clinical parameters was 85%. The mean number of subpleural consolidations detected by LUS per exam was 0.80. The mean number of consolidations detected on each CXR was 0.25. In 29% of preterm infants consolidations were detected both with LUS and CXR, in 71% only by LUS.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

CONCLUSION: Statistically significant interconnection between LUS and clinical parameters of respiratory status (FiO₂, PaCO₂ and SaO₂) existed in both groups of prematures (MV and OxTh). LUS was more accurate than CXR in detecting subpleural consolidations. LUS can be useful in following-up the effects of administered therapy in NICUs.

Delayed Myocardial Enhancement in children: Comparison of conventional technique to a dark blood imaging technique in Duchenne Muscular Dystrophy

Sahana Rajesh¹, Marc Lee², Judd Storrs³, Simon Lee³, Rajesh Krishnamurthy³, Lamya Atweh⁴

1. Undergraduate Student, The Ohio State University. Columbus, Ohio, USA
2. The Ohio State University, Columbus, Ohio, USA
3. Department of Radiology, Nationwide Children's Hospital. Columbus, Ohio, USA
4. Heart Center, Nationwide Children's Hospital. Columbus, Ohio, USA

Background: Delayed myocardial enhancement (DE) is a well-established method to assess myocardial fibrosis. In pediatrics, conventional inversion recovery technique is the gold standard for assessing DME, and is a breath-held, bright-blood technique, with scarred myocardium enhancing similarly to blood pool. Utilizing dark-blood imaging (DBI) improves visualization of scarring by suppressing signal from the blood pool. It is also a free-breathing technique, using short inversion time, which may reduce motion artifact in children or patients who cannot breathhold. Our aim is to compare this DBI sequence in patients with Duchenne Muscular Dystrophy (DMD) to the conventional DE technique.

Methods: Cardiac MRI studies from 27 consecutive patients (July-September 2022) with DMD were retrospectively analyzed. Subjects were scanned with conventional DE and DBI sequences in the short-axis plane, 8-10 minutes after contrast. Quantitative assessment was performed with regions of interest drawn in the blood pool, myocardium, scar, liver, and spleen. Image quality was assessed by two readers using a scoring system (1=non-diagnostic, 2=diagnostic, 3=excellent). The qualities assessed were overall visualization of scar, visualization of blood pool, visualization of myocardium, and motion related blurring. Wilcoxon Rank-sum tests were used to compare the two sequences.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Results: Our population had a mean age of 17 years (SD=8), average BSA of 1.5 (SD of 0.3), average HR of 91 bpm (SD=18), and average LVEF=53% (SD=5.8). Scar vs myocardium intensity ratio increased 6.14% for DBI acquisitions ($p<0.003$). DBI exhibited comparable image quality in three categories (blood pool, myocardium, scar visualization) with a medium rating of 3 for both readers with no statistically significant difference. DBI performed better than conventional DE with motion related blurring ($p<0.01$) with median rating for conventional DE being 2.5, and DBI being 3. The overall ratings presented a statistically significant difference ($p<0.05$) with the conventional DE median being 2.5, and the DBI being 2.75.

Conclusions: When compared to the conventional DBE sequence, DBI shows improved visualization of myocardial scar by suppressing blood pool signal and provides comparable imaging quality while providing improved motion correction with the advantage of removing constraints of breath-holding.

Chest

Primary cavitating tuberculosis in an 8-month-old infant

Ognesoska B¹, Dimitrijevic K², Pashoska M¹, Stojovska Jovanovska E¹, Petrovski A¹

1. PHI University Institute for Radiology Skopje, Republic of North Macedonia

2. PHI University Clinic for Pulmonology and Allergology Skopje, Republic of North Macedonia

Cystic and cavitary lung lesions in infants can be indicative of a range of underlying conditions, including primary cavitating tuberculosis and congenital pulmonary airway malformation (CPAM). In an 8-month-old infant presenting with these symptoms, a thorough clinical evaluation is necessary to identify the underlying cause of the lesions.

The radiological findings of advanced primary tuberculosis in an 8-month-old infant may include infiltrates, consolidation, cavitations and lymphadenopathy. However, these findings are not specific to tuberculosis and can also be seen in other conditions such as congenital pulmonary airway malformation when complicated with infection.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

CPAM is a congenital lung anomaly that results from an abnormality in lung development. The radiological features of CPAM include a cystic lesion in the lung, typically with well-defined margins and air-fluid levels, but it can contain only air.

Distinguishing between advanced primary tuberculosis and CPAM can be challenging, as both conditions can have similar radiological findings. However, other clinical features such as fever, cough, weight loss, and positive tuberculosis tests can help in the diagnosis of tuberculosis. In contrast, CPAM is typically asymptomatic and may be detected incidentally on routine imaging.

In summary, advanced primary tuberculosis in an 8-month-old infant can present with radiological findings that overlap with those of CPAM when complicated with infection. Tuberculosis in infants may present with unusual clinical and radiologic findings, and primary cavitary tuberculosis can also be seen in this age group. However, a careful evaluation of clinical features, radiographic imaging and appropriate diagnostic tests can help in distinguishing between these two conditions.

Keywords: infants, cavity, tuberculosis, CPAM

Pediatric Tuberculosis: From Head to Toe

Elazir Di Puglia¹, Tatiana Fazecas¹, Claudia Penna¹, Miriam Porto¹, Bianca Guedes¹, Bianca NireMBERG¹, Taisa Guarilha¹, Luiza Nahoum¹, Thiaago Duarte-Torres¹

1. Hospital Municipal Jesus (HMJ) DASA

Introduction: Tuberculosis (TB) is a major worldwide health issue caused by the *Mycobacterium tuberculosis* complex, which may affect various parts of the body and a wide range of age groups. When it comes to tuberculosis in children, the diagnosis may be radiologically suggested through the presence of hilar and mediastinal lymph node enlargement, a miliary pattern and a slow developing pneumonia.

There are two possible outcomes from a primary TB infection: the disease may enter a state of latency or it may progress to a primary disease. Once in its latent form, it can be reactivated and present in the form of pulmonary, extrapulmonary or disseminated TB. The primary complex, typical of the primary infection, is characterized by a pulmonary nodule and lymph

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

node enlargement with caseous central necrosis. The latent infection, in which there are no clinical symptoms, is defined by the presence of the Ghon complex, a pulmonary focus in association to a calcified hilar lymph node.

The purpose of this project is to describe the pulmonary and systemic findings of pediatric tuberculosis.

Materials and methods: We selected nine cases of confirmed tuberculosis in a population of pediatric patients with ages ranging from 2 months to 14 years old who were hospitalized in the Hospital Jesus, in Rio de Janeiro, Brazil.

Results: From the nine selected patients, one presented with a primary pulmonary complex and two with a progressive primary form of the disease. Both of these patients had complications: one developed pericardial effusion and the other cavitory pulmonary consolidations.

Five patients presented with the primary form of TB with hematogenous dissemination, leading not only to the involvement of the lungs, through the formation of randomic non-confluent micronodules, but also the spread of the disease to other systems such as the large intestines, the bones and articulations. Another patient developed the secondary form, with a pulmonary reactivation of the disease.

Conclusions: Radiological imaging plays an important role in the diagnosis and management of TB and, when paired with a correct assessment of the clinical setting, it leads to better care for the patient.

Pleuroparenchymal fibroelastosis after hematopoietic stem cell transplantation; report of a two cases

Gozde Ozer¹, H. Nursun Ozcan¹, Berna Oguz¹, Mithat Haliloglu¹

1. Hacettepe University Faculty of Medicine, Pediatric Radiology Department

Background: Pleuroparenchymal fibroelastosis (PPFE) is a rare interstitial pneumonia characterized by interstitial pulmonary fibrosis of the upper lobes. It can be idiopathic, but has also been found to be associated with hematopoietic stem cell transplant (HSCT), lung

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

transplant, chemotherapy, dust exposure, and infections. PPFE is characterized by elastic fibrosis of the upper lobes involving the pleura and subpleural parenchyma, and the definitive diagnosis is made by histopathological confirmation. Because of biopsy complications such as persistent postoperative pneumothorax and acute exacerbation, clinical and radiological diagnostic criteria for PPFE have been proposed to diagnose this entity without biopsy. Recent studies have shown PPFE may be underdiagnosed in children with a history of HSCT, leading to a delay in treatment and unnecessary lung biopsies. We aimed to present two patients who developed PPFE after bone marrow transplantation.

Case 1: 10-year-old girl underwent allogeneic HSCT due to thalassemia major at the age of 5. Platelet engraftment developed after HSCT and treated with immunosuppressive agents. Fifteen months after the HSCT, the patient presented with a dry cough. The chest computed tomography (CT) showed pleural and septal thickening with parenchymal bands in both upper lobes. The wedge biopsy from the right lung upper lobe was compatible with PPFE.

Case 2: The patient was diagnosed with neuroblastoma at the age of 5, then developed secondary acute myeloid leukemia when he was nine years old. He was treated with allogeneic HSCT. After four years, he presented with cough and dyspnea. The chest CT showed pleural thickening, atelectasis, and traction bronchiectasis in both upper lobes. Clinical and radiological findings were found to be compatible with PPFE at the multidisciplinary medical team meeting.

Conclusion: PPFE can develop as a lethal long-term pulmonary complication following HSCT in children. Therefore, familiarity with the clinical and radiological findings of PPFE is important for diagnosis, as lung biopsy may not be indicated in patients with characteristic findings on chest CT.

Invasive Group A Streptococcus - a pictorial review: How can radiologists help to guide clinicians' management?

Dr Harriet Edwards¹, Ms Emma Morton¹

1. Alder Hey Children's Hospital, Liverpool, UK

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Invasive Group A Streptococcal (GAS) infection in children has recently increased in the UK, assumed exacerbated by reduced socialising during Covid-19 lockdowns. The complexity of this infection, with rapid clinical deterioration, has led to challenging multidisciplinary discussions in our tertiary centre Intensive Care Unit (ICU). We reviewed our patient cases and the involvement of radiology to help guide the future education and management of this pathology.

Methods: Imaging, laboratory results and clinical notes of patients admitted to the paediatric ICU over a three-month period were reviewed by a radiologist and ICU nurse practitioner, with focus on imaging and its impact on subsequent clinical management.

Findings: Twelve patients aged 4 months to 15 years were admitted to the ICU between September and December 2022, all with non-specific symptoms and rapid clinical deterioration. Nine patients had severe lung consolidation, lobar collapse or empyemas with GAS confirmed from pleural fluid, endotracheal tube aspirates or throat swabs. Two patients had intracranial subdural empyemas with complicated cerebral abscess or infarction, and GAS confirmed on surgical aspirates. One node biopsy-confirmed case presented with widespread lymphadenopathy. Further complications included venous and arterial thrombi, multi-organ failure, pulmonary haemorrhage, organomegaly, limb ischaemia and bowel ileus.

Learning Points: Radiology played an influential role in the management of this patient group, predominantly using bedside ultrasound to assess vascular and lung pathologies, and radiographs to confirm lung effusions and collapse. The rapid and portable access of these investigations were invaluable to those too unstable to leave the ICU. MRI aided management of subdural collections and cerebral abscesses, with whole body skeletal surveys performed to identify infective foci. CT was used for initial intracranial presentations and guided management of thoracic pathologies.

Conclusion: Multi-modality imaging in invasive GAS patients enabled rapid management of complex and very unwell children. Patterns of radiological pathologies focused our use of portable chest ultrasound in unstable patients on our ICU, with all other modalities playing a role in assessment of the added complications found in these children, educating us for future cases.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Patient rotation on neonatal chest X-rays: determination, direction and misinterpretation**

Jani Marais, MBChB¹, Shyam Sunder B Venkatakrishna, MBBS², Juan S Calle-Toro, MD³, Pierre Goussard, PhD⁴ Savvas Andronikou, MBBCh, PhD, FRCR (Lon), FCRad (Diag)⁵

1. Groote Schuur Hospital, Cape Town, Western Cape, South Africa
2. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, USA
3. Department of Radiology, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA
4. Department of Pediatrics and Child Health, Faculty of Medicine and Health Sciences, Tygerberg Hospital, Stellenbosch University, Cape Town, South Africa
5. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, USA

Paediatric chest X-rays are routine for neonates, especially in the ICU. Patient rotation is an important determinant of quality which can cause misinterpretation.

Purpose: This educational exhibit will demonstrate the consequences of rotation on neonatal chest radiographs and how these affect diagnosis. In addition, we will demonstrate methods for determining the presence and direction of rotation.

Background: Patient rotation is common in chest x-rays of neonates, because they are unable to follow instructions and are often moving. Rotation is present in over half of chest x-rays from the ICU, contributed to by unwillingness of technologists to reposition newborns for fear of dislodging lines and tubes. Rotation is often unavoidable and therefore requires vigilance on the part of the interpreting radiologist/neonatologist to avoid misinterpretation or masking of significant findings. The six main effects of rotation on supine paediatric chest x-rays: 1) unilateral hyperlucency of the side that the patient is rotated towards; 2) the side 'up' appears larger; 3) apparent deviation of the cardiomeastinal shadow in the direction that the chest is rotated towards; 4) apparent cardiomegaly; 5) distorted cardio-mediastinal configuration and 6) reversed position of the tips of the umbilical artery and vein catheters with rotation to the left. These effects can cause diagnostic errors due to misinterpretation, including air-trapping, atelectasis, cardiomegaly, and pleural effusions, or disease may be masked. There is no universal method for evaluating rotation in children. It is accepted that the clavicles should NOT be used in contrast to adult chest x-rays. Instead, it should be assessed by the measurement

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



and comparison of the length of anterior or posterior ribs on both sides of the thorax. This educational exhibit will demonstrate this method of evaluating rotation with examples, including a 3D model of the bony thorax as a guide. In addition, multiple examples of the effects of rotation will be provided including examples where disease was misinterpreted, underestimated or masked.

Conclusion: Rotation is often unavoidable in neonatal chest x-rays, especially in the ICU. It is therefore important for physicians to recognise rotation, and its effects, and to be aware that it can mimic or mask disease.

High-resolution chest CT in children with severe asthma

Federica de matteis¹, M. S. Prevedoni Gorone², M. de Filippo², A. Licari², L. Preda²

1. IRCCS ICS Maugeri Pavia

2. IRCCS Policlinico San Matteo Pavia

Purpose or Learning Objective: To identify with the usage of HRCT biomarkers and diagnostic radiological equipment, variables able to predict the severity of asthma.

Methods or Background: We analysed CT data from 20 school-aged children (6-17 years) both males and females, with a confirmed diagnosis of severe asthma according to GINA guidelines, and 21 control school-aged children referred to our Pediatric Clinic who were prescribed a chest CT on a motivated clinical indication different from asthma. The following CT parameters were evaluated: total lung volume (TLV), mean lung density (MLD), airway wall thickness (AWT), a percentage of airway wall thickness (AWT%), BA ratio, bronchiectasis grading (BG) and severity (BS), Emphysema, Mosaic lung attenuation and mucus plugging's (MP). HRCT data were correlated to the following clinical parameters: forced expiratory volume in 1s (FEV1), forced vital capacity (FVC), forced expiratory flow at 25-75% (FEF25-75%), FEV1/FVC ratio, fractional exhaled nitric oxide (FeNO) and serum IgE level.

Results or Findings: The radiological findings that we highlighted to be significantly associated with the severe asthma were BT scores ($p < 0.001$; they were always 0 in the control group), AWT% ($p < 0.001$), BG and BS scores ($p = 0.016$), mucus plugging and centrilobular emphysema ($p = 0.009$). The AWT% had the highest interdependence, followed by BT scores and Centrilobular emphysema. In relation to the AWT% four subgroups have been identified. Sensitivity, specificity, and overall accuracy of this classifier were 95%.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusion: Utilizing HRCT throughout qualitative and quantitative evaluations of the parenchymal bronchial structures, we were able to identify radiological markers that can predict the severity of asthma. Particularly, a seclusion of AWT% (≥ 38.6) was identified as a discriminant against pediatric patients with severe asthma from controls.

Limitations: It is a monocentric retrospective study, and the sample size was limited. It was not possible to quantify the air trapping, because expiratory scans were not at the time of examination. The limited patient number due to CT imaging in children is not risk-free, and although the future cancer risk associated with low-level radiation (associated with CT) is not certain, expert panels agree that there is a small cancer risk that increases with increasing dose.

Blunt traumatic diaphragmatic hernia in a teenage boy: A case report

Nevena Lazović¹, Dušan Banovac¹, Zorica Joković¹

1. Radiology Department, University Children's Hospital, Belgrade, Serbia

Background: Traumatic diaphragmatic hernia (TDH) is rare in the pediatric population, occurring in less than 1% of all traumas in children. The most often cause of TDH is blunt trauma that happens, in more than half of cases, 68.4%, during road accidents. Different studies show a male prevalence; the median age is about 7 years old. A left-sided hernia is more common than a right-sided one, primarily due to the protective effect of the liver. Objective of our study is to demonstrate a case of blunt TDH in a teenage boy.

Case report: After a road accident, a 15-year-old boy presented in the hospital with pain in his left shoulder and hip. In physical examination, the patient had few excoriations and two cuttings in the region of the left hemithorax. Initial chest X-ray was without signs of fracture or pneumothorax. Furthermore, the abdominal ultrasound showed no traumatic lesions of the parenchymal organs or free fluid in the abdominal cavity. The patient was discharged for home treatment. During the next four months, the patient came to the hospital several times because of epigastric pain, usually after a meal, nausea and episodes of vomiting, but without clear and convincing clinical signs of acute surgical disease. Finally, he was kept in the hospital for diagnosis. The abdominal X-ray showed no signs of pneumoperitoneum and ileus, but an elevated left hemidiaphragm without a precise contour. Upper gastrointestinal series were performed and showed mesenteroaxial gastric volvulus with a highly suspicious intrathoracic

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



position of gastric corpus and left colic flexure. Computed tomography was done the same day and confirmed the suspicion of TDH with positive signs such as dependent viscera sign, intrathoracic herniation of abdominal contents, and elevated abdominal organs (stomach, small bowel loops and left colic flexure were visualized in the left hemithorax, 9 cm above the dome of the right hemidiaphragm). Abdominal organ repositioning and diaphragm primary repair were performed immediately after diagnosis.

Conclusions: TDH is rare in pediatric age with life-threatening complications and can be easily overlooked, so it's essential to have a high clinical index of suspicion after blunt thoracoabdominal trauma.

Lung involvement in pediatric rheumatic diseases; an elephant in the room of the rheumatology clinic

Spyridon Prountzos¹, Sofoklis Antonakis¹, Melanthi Tsikna¹, Argyro Mazioti¹, Fotis Lampros², Efthymia Alexopoulou¹

1. 2nd Department of Radiology, National and Kapodistrian University of Athens, University General Hospital "Attikon"
2. Rheumatology Unit, 3rd Department of Pediatrics, National and Kapodistrian University of Athens, University General Hospital "Attikon"

Purpose: This study aimed to describe the computed tomography (CT) findings of pulmonary involvement in children with rheumatic diseases.

Methods & Materials: Rheumatic diseases involve abnormalities of multiple organs and systems, but it is predominantly the musculoskeletal system that is affected. This retrospective study included 15 children (13 females and 2 males) with a median age of 14 years, who attended the Pediatric Rheumatology Unit of our hospital between 01/01/2021 and 01/01/2023. The spectrum of rheumatic diseases included 4 children diagnosed with systemic lupus erythematosus (SLE), 2 with systemic sclerosis, 2 with juvenile dermatomyositis, 2 with juvenile idiopathic arthritis (JIA), 2 with a mixed connective tissue disorder, and 1 with ANCApositive vasculitis, 1 with granulomatosis with polyangiitis and 1 with Raynaud syndrome. Children had no history of chronic lung disease prior to the diagnosis of the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



rheumatic disease, and those with concomitant lower respiratory tract infections were excluded. Common indications for reference to our department were dyspnoea, cough, and early fatigue during exercise. All patients underwent a chest CT examination using a paired end-inspiratory/forced-expiratory scan protocol using 1mm collimation and slice thickness reconstruction algorithm.

Results: We examined the presence of parenchymal opacities, ground-glass opacities, reticular pattern, honeycombing and parenchymal bands, bronchiectasis, and peribronchial wall thickening. Air trapping was assessed during expiratory scans. One-third of the patients (33%) showed parenchymal opacities, reticular pattern, and parenchymal bands. Two-thirds (60%) had ground-glass opacities. The vast majority (86%) presented with peribronchial wall thickening of varying degrees, while almost half (47%) of the patients had bronchiectasis. Only one patient showed honeycombing. Half (53%) of the patients showed air-trapping in the form of mosaic attenuation during expiratory scans.

Conclusion: To summarize, mild or even almost absent clinical symptoms, such as dyspnoea, cough, or early fatigue during exercise may reveal extensive findings of pulmonary alterations. Limitations of this study such as the retrospective nature and the relatively small group of patients point that further analyses need to be carried out in order to correlate radiological data better with clinical data, such as treatment regimes, and lung function tests.

References:

1. Richardson AE, Warriar K, Vyas H. Respiratory complications of the rheumatological diseases in childhood. *Arch Dis Child.* 2016 Aug;101(8):752-8. doi: 10.1136/archdischild2014-306049. Epub 2016 Jan 14. PMID: 26768831.
2. Rigante D, Cantarini L, Imazio M, Lucherini OM, Sacco E, Galeazzi M, Brizi MG, Brucato A. Autoinflammatory diseases and cardiovascular manifestations. *Ann Med.* 2011 Aug;43(5):341-6. doi: 10.3109/07853890.2010.547212. Epub 2011 Feb 1. PMID: 21284530.
3. Tarantino, G. Esposito, S. Andreozzi, L. Bracci, B. D'Errico, F. Rigante, D. Lung Involvement in Children with Hereditary Autoinflammatory Disorders. *Int. J. Mol. Sci.* 2016, 17, 2111. <https://doi.org/10.3390/ijms17122111>
4. Ramphul M, Gallagher K, Warriar K, Jagani S, Bhatt JM. Why is a paediatric respiratory specialist integral to the paediatric rheumatology clinic? *Breathe (Sheff).* 2020 Dec;16(4):200212. doi: 10.1183/20734735.0212-2020. PMID: 33447294; PMCID: PMC7792836.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





5. Assayag D, Kaduri S, Hudson M, Hirsch A, Baron M (2012) High Resolution Computed Tomography Scoring Systems for Evaluating Interstitial Lung Disease in Systemic Sclerosis Patients. *Rheumatology* S1:003. doi:10.4172/2161-1149.S1-003
6. Ruano, C. A., Lucas, R. N., Leal, C. I., Lourenço, J., Pinheiro, S., Fernandes, O., & Figueiredo, L. (2015). Thoracic Manifestations of Connective Tissue Diseases. *Current Problems in Diagnostic Radiology*, 44(1), 47-59. <https://doi.org/10.1067/j.cpradiol.2014.07.002>
7. Crestani, B. (2005), The respiratory system in connective tissue disorders. *Allergy*, 60: 715-734. <https://doi.org/10.1111/j.1398-9995.2005.00761.x>

Congenital Tracheal Stenosis: The Role of Radiology in Diagnosis and Management

Sunit Davda¹, Samantha Chippington¹

1. Department of Paediatric Interventional Radiology, Great Ormond Street Hospital, London, UK

Background: Congenital tracheal stenosis is a rare, but life-threatening condition that can cause respiratory distress in infants and children. It is characterised by complete cartilage rings of trachea without the normal membranous portion. Those with respiratory distress often require surgical intervention for which radiology plays a vital role. Various imaging modalities are used to assess the extent and severity of the stenosis and workup prior to surgery as well as the immediate post-operative period and longer term follow up. In children where the post-operative course is more challenging, radiologists can play a role both in the diagnosis and management through interventional techniques.

Methods: Our educational poster presents a summary of the clinical and radiologic evaluation of congenital tracheal stenosis, including the use of various types of CT, bronchoscopy, bronchography and Optical Coherence Tomography. The poster also discusses interventional

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

radiology techniques, such as balloon dilation and stent placement to help treat these patients in the post-operative course.

Results: The poster presents multimodality images that illustrate the imaging findings of congenital tracheal stenosis, including common associations (e.g. congenital cardiac anomalies). It demonstrates the importance of a multidisciplinary approach involving radiologists, ENT, intensive care, respiratory, cardiology and thoracic surgeons in the management of this condition.

Conclusion: Our poster provides a comprehensive overview of the role of radiology in the diagnosis and management of congenital tracheal stenosis. It highlights the importance of early recognition and prompt management to prevent respiratory distress and improve long-term outcomes. The poster aims to enhance awareness and understanding of this rare but potentially life-threatening condition amongst both general and paediatric radiologists, as well as the wider clinical team.

Pre-operative CT assessment of Congenital Chest Wall Deformities

Vera Brazão Carvalho¹, Pedro Riesenberger¹, Eduardo Bandeira¹, Ana Nunes¹, Eugénia Soares¹

1. Hospital Dona Estefânia - Centro Hospitalar Universitário Lisboa Central

Introduction/Objectives: Chest wall deformities are a set of congenital diseases that include a broad spectrum of disorders. To assess severity and to determine whether repair surgery is needed, different indexes are extracted from computed tomography (CT) images. We aim to illustrate key imaging features that allow differentiation of these pathologies and to present a sample structured report with the main indexes to be obtained for each type of deformity.

Material and methods: Bibliographic review and retrospective evaluation of chest CT from candidate patients for correction procedures in our paediatric university hospital.

Results: There is a large and diverse group of congenital abnormalities of the thorax that manifest as deformities and/or defects of the anterior chest wall. These anomalies vary by age at presentation, signs and symptoms, as well as evaluation and subsequent surgical treatment.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Pectus excavatum is by far the most common congenital chest wall deformity characterized by sternal depression, whose severity is evaluated by extracting three main indices (Haller index, correction index and asymmetry index). Other disorders described in this work are pectus carinatum, pectus arcuatum (also known as Currarino-Silverman syndrome), Poland syndrome, sternal clefts and ectopia cordis, that are not necessarily evaluated using the same indexes. We highlight imaging features that can predict worst outcomes or affect therapeutic decision.

Conclusion: Knowledge of the pre-operative radiologic considerations and appropriate indexes is essential in providing appropriate imaging support to the surgeons performing correction procedures treated by surgery or non-operative methods.

CT and Dose

Less is more: the efficacy of single phase vs. multiple phase pediatric CT trauma protocols.

Rami Shaheen¹, Ruth Cytter Kuint², Elena Zharkov³, Egal Frank⁴, Aner Keinan⁵

1. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

2. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel Faculty of medicine, The Hebrew university of Jerusalem, Jerusalem, Israel

3. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

4. Radiology department, Shaare Zedek Medical Center, Jerusalem, Israel

5. Pediatric surgery department, Shaare Zedek Medical Center, Jerusalem, Israel

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Trauma is a leading cause of morbidity and mortality in children. CT is the study of choice for evaluating trauma patients and single scan techniques are becoming more common.

Materials and Methods: A retrospective analysis of all pediatric (ages 0-18 years) trauma cases who underwent abdominal CT, between 01/7/2017-31/12/2022, in Shaare Zedek Medical Center, Jerusalem, Israel.

Patient scanning protocol was chosen according to the relevant protocols at the time of the trauma, and depending on the referring service (adult vs. pediatric emergency department). It was either multiple scan protocol (MSP) (early arterial and portal-venous phase) or single scan protocol (SSP) (delayed arterial phase (DAP) or split bolus injection (SPI)). Further scans were added, if required. The efficacy of the SSP group was estimated by the need of additional studies.

Results: 480 cases were reviewed, 105 females and 375 males. 184 had MSP and 296 had SSP (276 SPI, 20 DAP). In the SSP group, patients were younger (11.15 ± 4.56 year vs. 15.00 ± 4.03 , $P < 0.001$). The clinical parameters at admission (hemodynamic stability, intubation, GCS) were similar in both groups.

In the MSP group, 174 out of 184 patients (94.6%) had two scans, nine had three scans and one had four scans. In the SSP group 251 out of 296 patients (84.8%) had a single scan, 44 patients had two scans and one patient had three scans ($p < 0.001$). The average number of scans per patient in the MSP group was 2.06 vs. 1.2 in the SSP group.

Stab wounds ($p = 0.008$, CI 1.9-89.32) gun shots ($p = 0.014$, CI 1.48-34.43) and additional findings in added scans ($p = 0.014$, CI 1.69-102.48) were predictors of the need for further investigation regardless of initial study protocol.

In a single case in the SSP-SPI group, bleeding from a pseudoaneurysm was discovered a week later.

Conclusions: Our study shows that use of SSP resulted in fewer scans per patient with similar efficacy compared with MSP in pediatric trauma. Case management was not influenced by the protocol used.

Fetal

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Fetal MRI: Experience in Uruguay**Carlos Carnelli¹, Ana Parodi²

1. Asst Professor Radiology, Hospital de Clínicas, Universidad de la República, Montevideo, Uruguay.
2. Hospital de Clínicas, Universidad de la República, Montevideo, Uruguay

Backgrounds&Objectives: Fetal magnetic resonance imaging (FMRI) is a valuable complementary technique to prenatal ultrasound, useful in the detection and characterization of abnormalities of fetal development. The objective of this work is to describe the experience in the implementation of fetal magnetic resonance imaging in our hospital in the period between January 2021 and December 2021.

Methods: A descriptive, observational and retrospective study was carried out. The 30 FMR requested and stored in the PACS system from January 2021 to December 2021, performed at the Hospital de Clinicas, UdelaR, university hospital Imaging Service, were analyzed. Studies were performed with suspicion of thoracic, abdominal, osteoarticular or neurological pathology. All studies had a previous ultrasound (US) performed by qualified professionals.

Materials: The studies were done in the morning, with the patient fasting, in a Siemens Magnetom Avanto 1.5 Tesla machine using SSFSE (HASTE), SS (TrueFISP) and T1(SS-SPE) sequences. Scopolamine butylbromide 20mg e/v was administered. Gadolinium was not administered. The studies were interpreted by an Assistant Professor with experience in FMR. Demographic and clinical characteristics were evaluated, including age, weeks of gestation, type of pregnancy (single or multiple), pathologies found, concordance with ultrasound, and changes in treatment.

Results: All patients had an indication for MRI due to a pathology previously discovered on ultrasound, determine associated complications, classify severity, provide pre- and postpartum counseling, establish prognosis, and assess possible prenatal treatments. The study was well tolerated by the patients. Only one study was interrupted due to uterine contractions but nevertheless images obtained were of diagnostic quality.

Conclusions: MRI is useful in fetal diagnosis, providing sufficient information to act safely to gynecologists, neonatologists and pediatricians. It is not a method for the routine control of

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

pregnancy, but it is considered the complementary study to be carried out when fetal pathology is suspected.

A pictorial review of non-cardiac thoracic abnormalities in fetal MRI

Pedro Riesenberger¹, Vera Brazão Carvalho¹, Ana Forjaco¹, Rita Carneiro¹, Eugénia Soares¹

1. Hospital de Dona Estefânia - Centro Hospitalar Universitário de Lisboa Central

Introduction and objective: Fetal thoracic anomalies comprise a group of pathologic entities with different etiologies and outcomes. We aim to provide a pictorial review of the most common fetal chest pathologies studied with Magnetic Resonance Imaging (MRI), excluding cardiac abnormalities.

Material and methods: Topic review based on bibliographical research and selection of case images from a paediatric university hospital. Whenever possible imaging findings are correlated with post-natal imaging, clinical data and/or autopsy results.

Results: The most common fetal thoracic abnormalities studied with MRI comprise congenital diaphragmatic hernia, congenital pulmonary airway malformation and bronchopulmonary sequestration. Owing to its soft-tissue contrast and spatial resolution, MRI has established its role as an important adjunct to ultrasound on the study of fetal thoracic malformations, and has been shown to yield additional information to that provided by ultrasound. MRI findings can impact both the diagnosis, allowing the distinction between the main pathologic entities, and the prognosis, predicting the risk of pulmonary hypoplasia or other adverse clinical outcomes. Key imaging findings that allow the distinction between thoracic abnormalities and estimation of unfavourable outcomes are addressed and revised.

Conclusions: Fetal MRI is a valuable imaging tool on the study of fetal thoracic abnormalities and there are key imaging features that can guide the radiologist in the differential diagnosis and the prediction of adverse clinical outcomes.

Additive manufacturing models of fetuses built from three-dimensional ultrasound,

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****magnetic resonance imaging and computed tomography scan data**Heron Werner¹, Tatiana Fazecas¹, Pedro Castro¹, Flavia Paiva¹

1. Biodesing Lab Dasa /Puc - Rio

Objective: To generate physical fetal models using images obtained by three-dimensional ultrasonography (3DUS), magnetic resonance imaging (MRI) and, in some cases, computed tomography (CT) to guide additive manufacturing technology.

Methods: Images from 48 pregnant women, including 7 sets of twins, were used. Scans were performed using high-resolution 3DUS. In cases of abnormalities, MRI and CT, were performed on the same day as 3DUS. The images obtained with 3DUS, MRI or CT were exported to a workstation in DICOM format. A single observer performed slice-by-slice manual segmentation using a digital high-definition screen. Software that converts medical images into numerical models was used to construct virtual 3D models, which were physically made using additive manufacturing technologies.

Results: Physical models based upon 3DUS, MRI and CT were successfully generated. They were similar to the postnatal appearance of the aborted fetus or newborns, especially in cases with pathology.

Conclusion: The use of 3DUS, MRI and CT may improve our understanding of fetal anatomical characteristics, and these technologies can be used for educational purposes and as a method for parents to visualize their unborn baby. The images can be segmented and applied separately or combined to construct 3D virtual and physical models.

Imaging of fetal abdomen – single center experienceStokanovic Vesna¹, Laban Nikola¹, Mitić Dragan², Mladenovic Sanja¹, Milan Stefanovic^{3,4}

1. Center for radiology, University clinical center Niš, Serbia
2. Radiology department, General Hospital Pirot, Serbia
3. Obstetrics and Gynecology Clinic, University clinical center Niš, Serbia
4. Faculty of Medicine, University of Nis, Serbia

Contact: vstokanovic@gmail.com**BELGRADE, SERBIA / Crowne Plaza Hotel****05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Purpose/Objective/Background: MRI exam of fetal abdomen is a useful tool in evaluation of wide range of pathology affecting abdominal organs. It contributes to accurate diagnosis and prognosis of fetal conditions. Objective was to present our experience and findings from MRI exams of fetal abdomen.

Methods: We retrospectively reviewed all fetal MR exams performed on 3T GE Signa Pioneer MR machine at our institution during a period of three years. There were 53 fetal MRI exams in total from which seventeen cases aimed at fetal body imaging were selected and included in this study. We present our findings of various fetal abdomen pathology and its typical MR features.

Materials: All MR exams were indicated by gynecologist after ultrasound exam on which anomaly was seen or suspected. MR exams were performed without sedation, using various T2W, T1W and diffusion weighted (DWI) sequences. Gestational age of the fetuses at the time of the exam was between 21 weeks and 35 weeks.

Results: Most frequent pathology found were abdominal cysts. All five were found in female fetuses and four were ovarian cysts, and one was intestinal duplication cyst. Due to the size of the cysts, they were surgically removed after birth, and the diagnosis was confirmed.

We found hydronephrosis of various degree in four fetuses and two diaphragmatic hernias. MRI exam enabled us to visualize the size of the diaphragmatic hernias, which organs were displaced and to assess the size of the lungs.

Other pathology found were ascites, anal atresia, omphalocele, thoracic cyst.

In two cases based on US exam esophageal atresia and choledochal cyst were suspected, but MRI exam showed no anomalies, which was later confirmed on postnatal exam.

Conclusion: MR imaging is a complimentary diagnostic modality which enables us to confirm visualized or suspected anomaly on US exam and to characterize it more precisely. Additional information which MRI provides help differentiate lethal and non-lethal conditions, subsequently guiding the pregnancy management. Prenatal diagnosis facilitates parent counseling and planning of the delivery in an adequately equipped medical center to avoid unnecessary transportation of the baby after birth.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE

Gastrointestinal

MR Enterography in Pediatric Inflammatory Bowel Disease: Is the Inter-rater Agreement Better After Use of Single- or Evenly Split-dose Buscopan?

Jelenković Aleksandar¹, Koprivšek K¹, Bogdanović B¹, Simić D¹, Milak G¹, Stojšić M¹, Jojkić-Pavkov D¹, Tošić J¹

1. Radiology Department, Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, 21000 Novi Sad, Serbia

Background: MR enterography (MRE) is increasingly used for non-invasive assessment of intestinal inflammation in pediatric patients with inflammatory bowel disease (IBD). In order to obtain the high quality MRE images, the administration of spasmolytic agents (most commonly Buscopan) is obligatory. Data about the mode of Buscopan administration in pediatric patients with IBD is sparse and contradictory. The purpose of our study was to determine if administering an evenly split-dose of Buscopan would impact the inter-rater agreement, relative to the standard single dose.

Materials and Methods: We retrospectively evaluated a total of 112 MRE scans of children with IBD, examined with standard MRE protocol, at our MR unit between 2021–2023. In 90/112 patients MRE was performed with single-dose of Buscopan and in 22/112 with evenly split-dose (first dose administered after CINE study and the second before obtaining postcontrast images). Two general radiologists, with near-equal experience, evaluated MRE independently for both groups. The inter-rater agreement in detection of bowel wall inflammation, between the groups, on DWI, postcontrast studies and for final radiologist's reports, was assessed using the chance-corrected Cohen-kappa (κ) coefficient.

Results: Poor inter-rater agreement on presence of bowel wall inflammation was seen in the group where MRE was performed with single dose of Buscopan in all evaluated categories: DWI ($\kappa=0.018$, $p=0.743$), postcontrast studies ($\kappa=0.184$, $p=0.007$) and final radiologist's report ($\kappa=0.164$, $p<0.001$). In the group where MRE was performed with evenly split-dose Buscopan, substantial inter-rater agreement was found on DWI images ($\kappa=0.605$, $p=0.000$) and fair-to-moderate inter-rater agreement on both postcontrast images ($\kappa=0.384$, $p=0.007$) and on final radiologist's reports ($\kappa=0.348$, $p=0.000$).

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Conclusions: Our results suggest that application of evenly split-dose Buscopan can increase the agreement between inter-raters in pediatric patients with IBD. Further investigation is warranted in order to confirm the significance of suggested change in mode of spasmolytics application on better MRE image quality and inter-rater agreement.

Bellows and Beyond: A historical review, examining the evolution of intussusception reduction - from the 17th century to the present day in Northern Ireland

A Blackburn¹, P Baird-Fraser¹, S Burnside¹, A Paterson¹

1. Royal Belfast Hospital Sick Children

Background: Intussusception is the most common abdominal emergency requiring surgery in infants. It occurs when a segment of proximal bowel (intussusceptum) invaginates into more distal bowel (intussusciens), and it may result in complications including bowel obstruction, ischaemia, perforation and necrosis. Ileo-colic intussusceptions are the most common type; these are amenable to radiological reduction.

Peak incidence is between 4-36 months of age. The majority of cases are idiopathic; pathological “lead points” are documented more often in older children.

Historical overview: Venturing back in time to 1674, when Barbette proposed laparotomy to manage intussusception in his surgical textbook and moving forwards to the present, we describe how management has evolved.

Key dates:

- 1831: Successful air enema by Blalock on his own son
- 1838: Fireside bellows used to perform an air enema (Mitchell)
- 1871: 1st successful surgery in a child (Hutchinson)
- 1876: Manipulation and hydrostatic enema (Hirschsprung)
- 1886 +89: Cadaver experiments. 6psi acceptable pressure to reduce intussusception (Forest)
- 1913: 1st radiological diagnosis (Ladd)
- 1927: Barium enema reduction (multiple practitioners)
- 1948: Refining enema technique and the “Rule of 3s” (Ravitch/McCune)

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



- 1979: Diagnostic ultrasound in a child (Friedman)
- 1985: Ultrasound-guided hydrostatic reduction (Bolia)
- 1988: Re-introduction of guided air enemas to the Western world (Gu)

Current Guidance: In 2003, the British Society of Paediatric Radiology (BSPR) suggested departments have a 65-70% “raw” reduction rate. “Composite” reduction rates (CRR), discount cases where successful reduction is not theoretically possible (lead point/necrotic bowel at surgery).

In 2017 BSPR stated: Air enema is the technique of choice in the UK for attempted non-operative reduction of paediatric intussusception. US-monitored hydrostatic reduction has comparable outcomes to fluoroscopic-guided gas reduction

Belfast 2023

Multinational department - several consultants trained in mainland Europe. Fluoroscopically-guided CO₂ (air pre-2019) enemas and US-guided saline reduction both employed. Technique utilised dependent upon consultant’s personal expertise. Annual audit of intussusception data from 2007 (16 years’ information). 2007-2022 summated CRR (n=160) 86.9%. US-guided saline enema CRR (n=44) 84.1%. Fluoroscopically-guided gas enema CRR (n=116) 87.9%
Complication rate 2007-2022: 3/186=1.6%.

Conclusions: Standards for intussusception reduction are safely met in Belfast.

Imaging the Umbilicus

Beverley Newman¹

1. Stanford Childrens Hospital at Stanford University

Purpose/Objective: Illustrate and discuss the spectrum of lesions that occur around the umbilicus in infants and children, their imaging appearances and associated pathology.

Methods/Results:

Entities to be discussed include:

1. Omphalocele/umbilical hernia, problems and associations
2. Omphalitis
3. Urachus - patent, remnants, infection, mass

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

4. Vitelline duct – patent omphalomesenteric duct, remnants, Meckel's diverticulum and complications including bleeding, infection, intussusception, mass

Conclusions: It is important to have a thorough understanding of the embryology of the structures that traverse the umbilicus and the pathology that may occur in this region. Additionally, a retained connection to gut or bladder or remnants along these embryologic tracts, remote from the umbilicus, can mimic other pathologic entities and may be difficult to recognize.

Plain films can be helpful but are often nonspecific. The choice of additional imaging depends on the clinical presentation; ultrasound is often the first screening examination followed, if necessary, by CT, MR or nuclear medicine imaging studies for further diagnostic information.

Quantitative ultrasound liver measurements in obese and healthy children

E. Aguirre Pascual¹, M. Navallas Irujo¹, C. Gallego Herrero¹, M. Rasero Ponferrada¹

1. Hospital Universitario 12 de Octubre, Madrid, Spain

Background: Non-alcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease in children in many countries, closely linked to obesity. Liver biopsy is the gold standard for diagnosis. However, given its risk, cost and sampling variability, non-invasive imaging techniques have been investigated. US HepatoRenal Index (HRI) measures the differences in echogenicity between the right liver lobe and right renal cortex and has been described as an accurate method to diagnose and grade fatty liver disease, similar to US Attenuation Imaging (ATI).

Objective: To evaluate qualitative and quantitative measurements of liver parenchyma in healthy and overweight children using US HRI and ATI.

Materials and methods: This prospective study enrolled 32 overweight children with Body Mass Index ≥ 25 who underwent clinical abdominal US for liver disease and 35 children with BMI < 25 who underwent abdominal US for reasons other than liver disease. Exclusion criteria included absence of right kidney and non-optimal longitudinal US window for HRI measurement. HRI was obtained using ImageJ software by drawing two regions of interest (ROI) in the right liver lobe and two in the right kidney cortex on a single longitudinal image.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

All images were acquired in the supine position with the right arm extended above the head, through an intercostal approach for ATI.

Results: Thirty-five participants were healthy children (21 female) whose age ranged 4–15 years (mean 10.1 years, standard deviation [SD] 3.1); mean BMI 18 (range 13.4–24.6). Thirty-two participants were obese (13 female) whose age ranged 4–17 years (mean 12 years, SD 2.8); mean BMI 31.5 (range 25–61). Liver echogenicity was normal in 98.5% of healthy children (34/35) and in 34.4% of obese patients (11/32). HRI and ATI values were higher in patients with BMI > 25 than in healthy children (mean IHR 1.74 ± 0.52 vs 1.28 ± 0.38 ; $p < 0.001$ and mean ATI 0.7 ± 0.13 vs 0.54 ± 0.07 ; $p 0.001$).

Conclusion: US HRI and ATI are feasible non-invasive quantitative imaging techniques that show a good diagnostic performance in detecting and grading NAFLD in children. Further studies with larger cohorts and liver biopsies correlation are needed to establish cutoff values.

Two case of colon duplications-use of diagnostic imaging in the evaluation of gastrointestinal tract duplication

Dubravka Milutinovic¹, Polina Pavicevic¹, Nevena Lazovic¹

1. University Children Hospital, Tirsova 10, Belgrade

Background: Gastrointestinal tract duplication is a rare congenital malformation associated with the presence of additional segment of the fetal gut. They can be diagnosed as early as the prenatal period but are frequently found in infancy or incidentally in adulthood. The most common involving the distal ileum and second most common the esophagus. Many duplication cysts are asymptomatic and discovered as an incidental imaging finding, though they can also be symptomatic with an array of clinical presentations dependent largely on their location.

Material: During 2022 we had two cases of duplication of colon. The first one is female infant, age 33 weeks (preterm), and the second one is sixteen years old, healthy girl. They both came in University Children Hospital in abdominal pain, distension, vomitus, with temperature, during night shift.

Methods: We perform an initial ultrasound (US), and computed tomography (CT). On ultrasound and CT, infant (both performed immediately after birth) had large, folded, tubular

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



structure that seems like dilatated colon, fill with anechoic fluid, wall thickness about 2mm without post-contrast opacification.. The second case (older girl) on ultrasound had an cystic, heteroechogen mass, with clear color doppler signal ,on the left side of mesentery, but on CT it showed as heterodense cystic mass with post-contrast opacification. Surgery was the principal method of management symptomatic duplications and there were no surgery complications observed of gastrointestinal duplications.

Results: The intraoperative findings were completely consistent with radiology imaging on CT and US. Patohistology report confirmed in both cases –duplications of colon that are extremely rare (tubular in infants and cystic in older girl)

Conclusion: Clinical manifesdtations of gastrointestinsl duplications cyst are variable. Imaging studies most frequently reveal thin- or thick- walled cystic/tubular structure, adjacent to the wall of the neighbouring gastrointestinal segment. Ultrasound and computed tomography are the methods of choice in the evaluation og gastrointestinal duplications. Given the diversity of anatomic locations, multiple differential diagnoses, and the need for surgical intervention, it is valuable to comprehend the role of multimodality imaging in diagnosing duplication cysts.

Communication of Findings in Acute Appendiceal Ultrasound: Perceptions of Certainty

Harsimran Laidlow-Singh¹, Fiona McCurdie¹, Claire R Lloyd¹

1. Paediatric Radiology, Evelina London Children's Hospital, Guy's & St Thomas' NHS Trust, London UK

Background: Communication of imaging findings, including conveyance of diagnostic certainty, is crucial to effective clinical radiology practice. This is particularly relevant for studies which have a large bearing on patient pathway, i.e. whether or not to perform an appendectomy in the context of acute abdominal pain in children. Furthermore, there is good evidence that ultrasound findings for acute appendicitis can be categorised reliably into two distinct groups: “positive” and “negative”. Report wording should clearly indicate either a high or low certainty of the disease being present. However, in reality, a wide variety of phraseology is used in free text. Prior studies have demonstrated the variability in perceived certainty

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

ascribed to individual words and short phrases, but not in an applied clinical scenario such as this.

Materials and Methods: Retrospective QI (Quality Improvement) dataset of in- and out-of-hours ultrasound performed for acute appendicitis in children a tertiary paediatric hospital. Extraction of most commonly used concluding terminology. Perceived certainty evaluated by a survey of multiple professional groups including radiologists, surgeons, and emergency physicians. Identification of terminology with least and most variation in perceived certainty.

Results: We will demonstrate the degree of perceived certainty associated with commonly used phrases to communicate ultrasound findings in our dataset, including stratifying data according to the grade of operator, whether the study was performed outside normal working hours, and the professional group of the reader.

Conclusion: The language used in radiology reports is associated with a wide range of perceived certainty for the presence or absence of disease amongst medical professionals. For acute appendiceal ultrasound studies, interpretation of results into a dichotomous classification has been shown to be beneficial. Therefore selection of the most clearly understood phraseology is advisable. This could be adopted at individual level, or institutionally, including the use of standardized reporting templates.

Bowel Ultrasound – From the Essentials to the Extraordinary

Joy Barber¹, Andrew Bain¹, Steven Jarvis¹

1. Department of Radiology, St George's Hospital, London

Purpose: Bowel ultrasound is becoming increasingly commonly practiced.

It is important to have a strong grasp of the fundamentals of bowel ultrasound, to be able to distinguish normal from abnormal across the length of the bowel.

In addition to identifying active inflammation in the bowel, there are also more unusual pathologies that can be encountered. We will illustrate a range of these here.

Methods: We perform over 250 bowel ultrasound scans per annum, and present here for you the highlights from our experience.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

We will start from the basics of how to ultrasound the bowel, and include a comprehensive pictorial review of normal and inflamed bowel across segments, with multimodality correlation.

More unusual pathologies are also included from our archive, from the stomach to the rectum, including meckel's diverticulum, unusual GI tract infections, juvenile polyps, GVHD, bowel haematomas, vascular malformations, and a very unusual appendicitis amongst others.

Results: After this poster, the reader will be equipped with the basics to get scanning bowel ultrasound systematically, and will be enthused to push the boundaries in identifying new pathologies

Conclusion: We hope bowel ultrasound will become part of 'routine' abdominal ultrasound scanning, and a strong knowledge of the basics and awareness of more unusual pathologies is essential for good practice in this area.

Paediatric Small Bowel Evaluation – MRI or Ultrasound, a shifting balance?

Joy Barber¹, Steven Jarvis²

1. Department of Radiology, St George's Hospital, Blackshaw Road
2. Superintendent Sonographer, St George's Hospital, London

Background: At our tertiary centre, bowel ultrasound scanning has more than tripled since the Covid-19 pandemic whilst our MRI requests have remained relatively static - possibly due to restricted access to MRI during the pandemic building both our experience in bowel ultrasound and referrer confidence in the capabilities of ultrasound.

In adults, the METRIC study steered imaging of the small bowel in IBD towards MRI, however there is yet to be such definitive evidence of the benefit of MRI versus ultrasound in children. We set out to investigate in which patients we are seeing bowel disease on ultrasound versus MRI, and to investigate the factors influencing the choice of modality.

Methods: Bowel imaging studies (both MRI and ultrasound) performed over a 2 year period (February 2021- 2023) were reviewed. Subsets of patients were evaluated who had

- 1) undergone both MRI and ultrasound during the study period
- 2) undergone multiple ultrasound or multiple MRI studies

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Reports and images were reviewed for location and detectability of disease on MRI and ultrasound. Factors influencing disease detectability were noted.

Results: During the two year study period, 563 studies were performed on 371 patients. 44 children underwent both MRI and ultrasound assessment during the two year period.

Of the 44 children, 8 had their disease first identified on MRI, and 36 on bowel ultrasound. 9 patients had most of their follow-up imaging with MRI, 10 equal between the modalities, and 25 with mostly ultrasound.

On review of the imaging and reports, bowel disease was better seen on MRI in 10 children, on ultrasound in 15 children, and equally well on both modalities in 19 children.

Where there was a preference for ultrasound, patients tended to be younger, and mostly had isolated terminal ileal disease, or multifocal jejunal/ileal and terminal ileal disease.

Conclusions: Bowel ultrasound in IBD has increased in recent years, and in some patients disease is seen more clearly on ultrasound than MRI. In our presentation we further explore the reasons behind this, and suggestions for patient selection for each modality.

No need for fasting prior to Doppler ultrasound of pediatric liver transplants

Martijn V. Verhagen¹, Ruben H. de Kleine², Hubert P.J. van der Doef³, Thomas C. Kwee⁴, Robbert J. de Haas⁵

1. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, m.verhagen@umcg.nl
2. Department of Hepatobiliary Surgery and Liver Transplantation, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, r.de.kleine@umcg.nl
3. Department of Pediatric Gastroenterology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, h.p.j.van.der.doef@umcg.nl
4. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, t.c.kwee@umcg.nl
5. Department of Radiology, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands, r.j.de.haas@umcg.nl

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Children after liver transplantation undergo frequent routine Doppler-ultrasound (DUS) for which they are fasted, which may cause hunger and discomfort. We aimed to determine if DUS measurements are affected by prandial changes. We also tested the hypothesis that the portal vein (PV) velocity ratio (VR) is less affected by prandial changes than the PV intra-anastomotic peak systolic velocity (PSV), for the assessment of the PV anastomosis.

Methods: Children were prospectively included to undergo pre- and postprandial DUS at 6 months after LT at our national pediatric LT center. Pre-anastomotic PV PSV, intra-anastomotic PV PSV, and all other routine DUS measurements were obtained. For the PV the pre- to anastomotic VR was also determined. In addition, obscuration by bowel gas, difficulty of DUS because of distress, and impact of fasting on children and their parents were assessed.

Results: Twenty-four children (mean age at DUS 6.1 years, SD 5.9 years) were included. DUS measurements between pre- and postprandial DUS were not significantly different. The hypothesis that PV VR would remain more stable than intra-anastomotic PV PSV was disproven. The degree of obscuration by bowel gas or ease of DUS did not change after eating. The majority (13/24, 54.2%) of children found fasting difficult, and several (10/24, 41.7%) got upset when fasted.

Conclusion: Children with an LT do not need to be fasted for routine DUS, and this may decrease the disease burden. PV VR was not superior to intra-anastomotic PSV for the assessment of the PV anastomosis.

Is Washout a Reliable Indicator of Malignancy? Re-evaluating the Diagnostic Significance of Washout for Focal Liver Lesions in Pediatric Population

M.Thaler¹, D. Ključevšek¹, M. Glušič¹, A. Gazikalović¹

1. University Childrens Hospital of Ljubljana

Purpose: This study aims to determine the reliability of washout in liver intravenous contrast-enhanced ultrasonography (CEUS) as an indicator of malignancy in pediatric patients with focal liver lesions (FLL).

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Material and methods: We performed a retrospective analysis of the last 50 liver CEUS exams at our hospital in children from newborn to 18 years of age. Only children with washout in liver CEUS were further evaluated and compared to clinical and laboratory data, abdominal MRI or CT and fine needle biopsy if available.

Results: Out of 50 liver examinations using CEUS only 4 children with FLL were identified as having a contrast wash-out. In 3 cases liver MRI with Primovist were performed and in one case abdominal CT. In 2 cases fine needle biopsy was done.

In 2 cases MRI with Primovist indicated atypical focal nodular hyperplasia (FNH), in one child the result of MRI was inconclusive as well as the result of CT in one case. Fine needle biopsy in children with inconclusive results was performed; smooth muscle benign leiomyoma associated with EBV was found, the other was malignant post transplant lymphoproliferative disease (PTLD).

Conclusion: Washout in focal liver lesions in the pediatric population may not always indicate malignancy, as it can also be observed in benign lesions. Therefore, accurate diagnosis requires good clinical information, additional imaging and/or lesion biopsy.

Despite the limited sample size, our study confirmed malignancy in only one patient who had PTLD. CEUS was a reliable diagnostic method only for FLL in cases with typical enhancement patterns. All atypical CEUS enhancement need further diagnostic procedures, despite low probability of malignancy.

Key words: Intravenous contrast-enhanced ultrasonography, CEUS, focal liver lesions, FLL, malignancy, benign lesions, washout, enhancement patterns.

Role of the Radiologist in management of Necrotising Enterocolitis (NEC) – A pictorial review for trainees

Maryam Adil¹, Aung Oo¹, Alexander Pearce¹, Richard Jenkins¹

1. University Hospital Southampton

Purpose: Necrotising Enterocolitis (NEC) is a most common acute gastrointestinal condition in infants, particularly premature infants. It is potentially life threatening and imaging plays a

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

vital role in early diagnosis and identifying potential complications to limit morbidity and mortality.

The purpose of this educational poster is to demonstrate common imaging findings on plain abdominal radiographs, which remains the standard mainstay investigation, and the role of ultrasound and fluoroscopy.

Methods and Materials: A review of supine and lateral radiographs which illustrate the patterns of disease manifestation and common complications. We will also cover how ultrasound can be a useful adjunct in making the diagnosis and identifying the patients requiring surgery, and fluoroscopy can also be used in post resection NEC management.

Results: This educational poster will help trainee radiologists to learn about the common radiographic findings of NEC, when ultrasound can be used to aid diagnosis and the role of fluoroscopy in post-operative management of NEC.

Conclusions: Radiologists play a key role in early diagnosis of NEC, as imaging findings may precede clinical signs, and guiding the disease management.

Bilious vomiting does not always mean malrotation!

Dr. Rituparna Saha¹, Dr. Manigandhan Thayagarajan¹

1. Birmingham Children's Hospital

Purpose/Objective/Background: Bilious vomiting is a common clinical presentation in the neonatal age group at a Tertiary care Hospital. The neonatologists often raise the possibility of malrotation and get surgical and radiology opinion. An upper GI contrast study is often performed to rule out malrotation with or without volvulus. If positive for malrotation, the baby undergoes an urgent Ladd's procedure. However, not all neonates presenting with bilious vomiting have malrotation.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Materials: Birmingham's Children's Hospital is a tertiary care hospital in the West Midlands region of the UK. It runs a drive through service for neonates in the West Midlands region presenting with bilious vomiting.

Methods: This is an educational poster illustrating some examples of neonates who presented with bilious vomiting who did not have malrotation.

Results: The GI contrast study was performed in all the neonates in our poster. A detailed history was taken prior to the study. Sepsis was found to be the most common cause of bilious vomiting in premature infants. In the term neonates, although malrotation is the most common cause of bilious vomiting, other causes include Ladd's bands, duodenal atresia, jejuno-ileal atresia, meconium ileus, necrotising enterocolitis etc.

Conclusions: Bilious vomiting does not always mean malrotation. A detailed history is very important to consider sepsis as a possibility especially in premature babies. An ultrasound study may be performed to look at the SMA/SMV relationship, preduodenal SMV and situs etc.

Multi-reader study of quantified motility MR Enterography in Paediatric Inflammatory Bowel Disease: good agreement regardless of radiologist seniority

R Meshaka¹, C Foster¹, C Reid¹, E Allan¹, R Murphy¹, H Fitzke¹, A Menys¹, T Watson¹

1. Great Ormond Street Hospital for Children

Background: Small bowel disease response assessment using MR enterography (MRE) in paediatric inflammatory bowel disease (PIBD) is often subjective. Change in quantified terminal ileal (TI) motility ($\Delta_{GIQuant}$) used by expert readers has shown promise as potential biomarker of treatment response [1]. We investigated inter-reader agreement quantitative bowel motility measurements taken by junior, senior and expert readers.

Methods: This study was approved by local ethics committee (REC 10-H0-720-91). A single centre, retrospective search included all patients <18 years with PIBD and >1 MRE between 2012-2022. Cine images from each patient's first two MREs were processed using FDA approved GIQuant®. TI motility was assessed at both timepoints by two experts (paediatric radiologists, bowel subspeciality interest, >5 years consultant experience); two seniors (paediatric radiologists bowel subspeciality interest, <3 years consultant experience) and two

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



juniors (paediatric radiology fellows). All readers completed the same training and 5 test cases before their reads.

Inter-reader agreement was assessed for each pair of readers as the Bland-Altman bias and limits of agreement (LoA) for $\Delta_{GIQuant}$ score (arbitrary units, a.u.) and %agreement in the Δ direction (stable/increasing vs decreasing score).

Results: There were 64 patients (33 male) aged 5-16, equating to 128 MREs, with a mean time between scans of 22 months (range 3 to 69 months). Diagnoses included 57/64 (89%) Crohn's disease, 3/64 (5%) ulcerative colitis, 2/64 (3%) very early onset PIBD and 2/64 (3%) PIBD unspecified. There was no systematic bias between any of the pairs of readers, with bias at 2 (95% CI -20 to 25), -26 (95% CI -64 to 11) and 2 (95% CI -64 to 11), in expert, senior and junior readers, respectively, but more variation was seen between the senior readers. Reader agreement on Δ direction of motility score at the TI was fair-good with 86%, 63% and 86% between expert, senior and junior readers, respectively.

Conclusion: Quantitative motility in PIBD MREs can be reliably measured by readers of varying experience with good levels of agreement. As a novel tool, these results are highly encouraging that if translated to routine clinical practice, GIQuant® could be used by any radiologist.

Ultrasonography evaluation of constipation in paediatric age group

Emine Neztet Oglou¹, Eirini- Dimitra Klontza², Aikaterini Kampouri³, Neslichan Kampasakal Chousein⁴, Savas Deftereos⁵

1. Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece
2. Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece
3. Associate Professor of Paediatric Surgeon, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece
4. Neslichan Kampasakal Chousein: Radiology Resident, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





5. Savas Deftereos: Associate Professor of Radiology, University Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece

Purpose: The aim of this study is the estimation of rectal diameter and rectal wall thickness by Ultrasonography in order to evaluate constipation in paediatric age group. Also, to minimize the use of abdominal radiographs and if it is possible, digital rectal examinations.

Materials and methods: This study includes 14 children aged 2,5month to 13 years old, who presented with clinical abdominal pain and have diagnosed with constipation according to Rome III criteria. The control group consists of 21 children, who are constipation free. A transabdominal ultrasound was performed to measure the rectal diameter and the rectal wall thickness.

Results: The rectal diameter is larger (CPA 2,55 > 3,55 cm) and the rectal wall is thinner (CPA 0,44 >1,17 cm) in children with constipation than in those without constipation. Our findings suggest that the transabdominal ultrasound scan might has a place in the diagnostic quiver of constipation and could replace the abdominal x-ray but not the digital rectal examination.

Conclusion: Transabdominal ultrasound scan may be a useful tool in the diagnosis of constipation. In paediatric age group with constipation rectal diameter is larger and rectal wall is thinner than in constipation free patients.

Limitations: Ultrasound is an operator-dependent examination and the findings may differ between radiologists. Also, the exam can be affected by different body types.

Vanishing Twinkles – A unique case of self-resolving infantile adenomyomatosis of Gallbladder

Sreekumar Muthiyal¹, Alaa Osman Koko¹, Jouhar Kolleri¹

1. Dept . of Radiology , Hamad General Hospital , Hamad Medical Corporation, Doha, Qatar
PO BOX. No: 3050

Objective: To entice an interesting clinical entity, which is sparsely occurs at early years of life as per literature. To highlight the presentation and clinical course of the entity.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Introduction: Gallbladder adenomyomatosis is characterized by hypertrophy of the gallbladder mucosal epithelium and invagination of the mucosa into the thickened muscular layer, causing the formation of sinus tracts called Rokitansky-Aschoff sinuses (1). Cholesterol crystals from bile get trapped in these sinuses. Rarely, adenomyomatosis has been described in the pediatric population; however, even fewer cases have been described in infants (1,2,3). We present a similar case in a one and half -month-old female infant.

Case report: One and half month-old female infant was admitted our hospital with fever, vomiting and dehydration. The laboratory parameters revealed persistent hypokalaemia and metabolic alkalosis. Ultrasound abdomen was done as a part of work up, which showed distended gall bladder with multiple intramural and wall attached hyperechoic foci, showing comet-tail reverberation artefacts and twinkling artifacts on colour doppler; suggestive of adenomyomatosis of gall bladder. No feature of acute cholecystitis was seen. Follow up scan after three weeks revealed complete resolution of the above-mentioned hyperechoic foci. Hence further follow up was not required.

Discussion: Gall bladder adenomyomatosis has been rarely reported in the pediatric population and even fewer cases are reported in infants with a self-resolving course (1,2,3). Our indexed case is a similar one. The main patterns of gallbladder adenomyomatosis are generalized, localized, segmental, and annular (1,2). The differential diagnosis for gallbladder adenomyomatosis includes cholelithiasis, gallbladder polyps, and emphysematous cholecystitis (1).

Conclusion: Gall bladder adenomyomatosis is extremely rare in infantile age group. We present a similar interesting paradigm with a self-resolving course.

References:

Charles B. Chen et al. Gallbladder Adenomyomatosis in an Infant ACG Case Rep J e00433 July 27, 2020

1. Sindhura Alapati et al Neonatal adenomyomatosis of the gallbladder: An incidental finding at 12 hours of life Radiology Case Reports 2014;9(3):859.

Chelsea Sparks et al Infantile Adenomyomatosis of the Gallbladder in a 3-Month-Old. JPGN Reports (2021) 2:4(e140).

A pictorial guide tour through Paediatric Pancreas Pathologies

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Vera Brazão Carvalho¹, Rita Prata¹, Pedro Riesenberger¹, Eduardo Bandeira¹, Ana Nunes¹, Eugénia Soares¹

1. Hospital Dona Estefânia - Centro Hospitalar Universitário Lisboa Central

Introduction: Once considered uncommon, pancreatic diseases are increasingly recognized in the paediatric age group. In this spectrum are included inflammatory and insufficiency disorders, but also focal disease, including cystic, solid and mass-like lesions.

Objective:

- To provide a pictorial overview of radiological findings of common and uncommon pancreatic pathologies, including lesions presenting as pancreatic masses in children and adolescents.
- To discuss the imaging technique of choice and differential diagnosis in each case, as well to illustrate key imaging features that allow differentiation of these pathologies.

Material and methods: Bibliographic review and retrospective analysis based on iconographic research in our paediatric university hospital picture archiving system.

Results: Commonly a few broad categories of diseases affect the paediatric pancreas that can be characterized on imaging: acute or chronic pancreatitis, pancreatic insufficiency disorders (cystic fibrosis, Schwachman-Diamond syndrome, history of steroid therapy), cystic lesions (pseudocysts, congenital simple cysts, autosomal dominant polycystic kidney disease, von Hippel-Lindau disease, cystic fibrosis, cystic neoplasms), solid neoplastic lesions (epithelial and non-epithelial) and non-neoplastic mass-like lesions (retroperitoneal tuberculosis or hematoma). A multimodality imaging approach are often used for evaluation of pancreas. The usefulness of ultrasonography in evaluating this gland in children is well known. Computed tomography (CT) or magnetic resonance imaging (MRI) with cholangiopancreatography (MRCP) are typically required for more thorough characterization. Patient age, signs and symptoms at presentation, laboratory test results, and potential underlying cancer predisposition syndrome can be helpful when formulating a differential diagnosis.

Conclusions: Diagnostic imaging plays a major role in the evaluation of the pancreas in children. For the diagnostic radiologist, complete knowledge of typical features that commonly affect this gland plays a critical role in appropriate management of pancreatic disorders in the paediatric population.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Hepato-renal index in children with overweight undergoing lifestyle intervention

Virginie Frings¹, Judith Lubrecht¹, Simon G.F. Robben², Anita C.E. Vreudenhil¹

1. Department of Pediatrics, Centre for Overweight Adolescent and Children's Healthcare, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands;

2. Department of Radiology, Maastricht University Medical Centre, 6229 HX Maastricht, The Netherlands

Background: Hepato-renal index (HRI) is a non-invasive and quantitative imaging biomarker to detect liver disease. Non-alcoholic fatty liver disease (NAFLD) is present in up to 38% of children with obesity and can progress to end-stage liver disease. The only current treatment is combined lifestyle intervention. In this study we investigated the change of HRI in patients undergoing such intervention.

Methods: Patients <18 years old with overweight or obesity who underwent lifestyle intervention at the Centre for Overweight Adolescent and Children's Healthcare (COACH) in Maastricht, The Netherlands, were included. Weight, height and age were recorded at baseline and at follow-up after 1-4 years of treatment, together with ultrasonography of the liver with qualitative and quantitative analyses. Quantitative assessment with HRI was performed with a region of interest of 908 pixels placed in liver parenchyma without large blood vessels and compared to a region of interest in kidney cortex. The average of three measurements was taken as the definite HRI. Patients were categorized by increased or decreased body mass index (BMI) z-score at follow-up and changes in HRI per group were analyzed.

Results: Five-hundred-and-one patients were included with a mean age of 11.8 year (SD 3.6) and a mean BMI z-score of 3.2 (SD 0.76) at baseline. Median alanine aminotransferase (ALT) was 22 U/L (IQR 18-29) at baseline, and HRI 1.44 (IQR 1.24-1.68). ALT was not statistically different between non-steatosis and steatosis group at baseline ($p=0.18$), but HRI was significantly increased within the group of patients with steatosis ($p<0.001$). At 1-4 years of follow-up 141 patients were screened of which 57 patients (40%) had a stable or decreased BMI z-score. HRI was not significantly different at follow-up compared to baseline ($p=0.65$) and was irrespective of change in BMI z-score ($p=0.19$).

Conclusions:

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

HRI is not significantly different after 1-4 years of lifestyle intervention and is not associated with changes in BMI z-score within this time-window.

Cystic intraabdominal masses in children: a case based review

Dr Zoë Nicholls¹, Dr Emily Mayo¹, Dr Alison Evans¹

1. Radiology Department, University Hospital of Wales South Wales Radiology Training Programme

Background: Intra-abdominal cystic masses in infancy and childhood are uncommon. Their clinical presentation, localisation, aetiology and histology can differ significantly, presenting a diagnostic challenge. They may arise from the solid abdominal or pelvic viscera, retroperitoneum or mesentery. Accurate diagnosis is key in ensuring prompt and appropriate management. Ultrasound is the initial imaging investigation of choice, with subsequent cross-sectional imaging with CT or MRI used to help delineate anatomical associations and characterise further.

Purpose: Revision of common and less common causes of intra-abdominal cystic masses in children to use as an adjunct in what can often present a diagnostic dilemma.

Methods and Materials: Case studies of interesting and unusual cases of intra-abdominal cystic masses are presented to highlight a range of differential causes. Images will be used to demonstrate the radiological findings according to imaging modality which can be used to differentiate between different aetiologies.

Conclusions: Appreciating the typical radiological findings of common and less common aetiologies of intra-abdominal cystic masses is important to guide appropriate management and improve patient care.

Genitourinary

Voiding Cystourethrography: what a radiologist should know

Cristina Mota^{1,2}, Filipa Marques dos Santos^{1,2}, Paula Coelho^{1,2}, Ana Teresa Almeida^{1,2}

1. Department of Imagiology

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

2. Centro Hospitalar Vila Nova de Gaia/Espinho, EPE

Purpose/Objective/Background: Voiding cystourethrography (VCUG), also known as a **micturating cystourethrography**, is a fluoroscopic study of the lower urinary tract in which contrast is introduced into the bladder via a catheter. VCUG aims to image the urinary tract, including the urethra, bladder, ureters, and kidneys, during bladder filling and emptying. This test is commonly performed in children with prenatally diagnosed hydronephrosis (PNH), urinary tract infections (UTI), and voiding abnormalities.

In this educational exhibit, we aim to review the clinical indications to perform **VCUG from** the American College of Radiology and the Society for Pediatric Radiology. We also aim to provide a “pictorial review” of the most common pathologies.

Methods/Materials: We will review the current literature and using cases from our hospital we will illustrate the normal anatomy of the urethra and bladder, urethral strictures, acquired urethral and bladder diverticula, vesicoureteral reflux, and congenital anomalies.

Results: The revision of the current literature revealed that the recent VCUG protocols are designed to optimize the visualization of disease and to improve patient safety, minimizing radiation exposure. In general, most VCUG protocols are identical: parents’ presence, contrast infusion by gravity, thin catheter without balloons, no contrast dilution, and voiding without a catheter in place.

Also, nowadays, the VCUG is indicated for evaluation of UTI, primary VUR, PNH, and lower urinary tract dysfunction including posterior urethral valve, and neurogenic bladder.

Conclusions: Thus, familiarity with these abnormalities and the use of proper techniques will allow the detection of the most common pathologic conditions with very low radiation exposure and will improve diagnostic accuracy.

Usefulness of Contrast-Enhanced Ultrasound (CEUS) in evaluation of early and late pediatric kidney transplantation complications

Dorota Majak¹, Katarzyna Chmielewska¹, Jędrzej Sarnecki¹, Małgorzata Szorc¹, Elżbieta Jurkiewicz¹

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





1. Department of Diagnostic Imaging, The Children's Memorial Health Institute, Warsaw, Poland

Kidney transplantation (KTx) is considered the therapy of choice in end-stage renal failure. Despite considerable improvements in surgical techniques and perioperative care, KTx is still associated with a significant number of complications that can lead to graft failure.

Gray-scale ultrasound (US) coupled with color or spectral Doppler techniques is the first-line imaging modality for the evaluation of transplanted organs. Computed tomography (CT) or magnetic resonance imaging (MRI) can be used as second-line imaging modalities in certain cases, however they are associated with ionizing radiation exposure and iodinated contrast administration, and potential sedation and gadolinium contrast administration, respectively.

Pediatric applications of contrast enhanced ultrasound (CEUS) are growing, however, in Europe US contrast agents are not yet registered for intravenous use in children.

Possible indications for the application of CEUS in children following KTx are similar to those in adults. CEUS, using second generation contrast agents, can be used as a complimentary tool to evaluate for vascular and parenchymal complications.

Objective: To present the usefulness of CEUS in the evaluation of vascular and parenchymal complications in renal allograft in children.

Materials: We present four cases of pediatric patients, in whom CEUS was applied to evaluate vascular patency, parenchymal perfusion and focal lesions in renal allografts.

Patient 1

CEUS was performed to evaluate vascularity and parenchymal perfusion in renal allograft with 4 renal arteries due to suspected vascular and ischemic complications.

Patient 2

CEUS was performed to assess parenchymal perfusion in the early postoperative period due to suspected local infarction in routine Doppler ultrasound.

Patient 3 and Patient 4

CEUS was performed in order to assess new focal lesions detected during the regular ultrasound follow-up.

Results: In Patient 2 (segmental infarction) and Patient 4 (PTLD), the pathological features identified in CEUS were confirmed using CT.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

No additional invasive diagnostic procedures were needed in patients 1 (normal parenchymal perfusion) and 3 (benign lesion - cyst).

Conclusions: CEUS can provide additional, clinically relevant information in pediatric patients with early and late complications following renal transplantation. As an imaging modality with no nephrotoxic effects CEUS can be used repeatedly even in patients with limited renal function.

Herlyn-Werner-Wunderlich syndrome: US and MRI findings

Filipa Lima Coelho¹, Catarina Carvalho¹, Bruno Giesteira¹, Joana Maciel¹, João Amorim¹, Manuela França¹

1. Centro Hospitalar Universitário do Porto

Purpose: Herlyn-Werner-Wunderlich (HWW) syndrome is a rare congenital anomaly characterized by uterus didelphys with obstructed hemivagina and ipsilateral renal agenesis (also called OHVIRA).

Methods and Materials: Pictorial review of US and MRI scans of 3 cases of HWW syndrome incidentally diagnosed, at the age of 10 months, 12 years, and 13 years, that we're being followed in our institution in pediatric nephrology for renal agenesis.

Results: HWW syndrome is a rare congenital anomaly of the urogenital tract involving Müllerian ducts and Wolffian structures. The exact cause, pathogenesis, and embryologic origin of HWW syndrome are unclear. Usually is identified in the first few years after menarche. Imaging modalities used to diagnose this condition include US, MRI, and Laparoscopy, the last one also has a therapeutic value. US is a very helpful tool in the diagnosis of Müllerian duct anomalies. The detection of hydro/hematocolpos, can make the diagnosis of genito-urinary tract anomaly easier, as we have proven in our 10-month-old case.

MRI is a suitable technique for the non-invasive evaluation of female pelvic anatomy, but also to is also sensitive in detecting associated aspects of this syndrome such as renal tract anomaly endometriosis, pelvic inflammation, and adhesions.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



The typical MRI findings will be the presence of uterus didelphys, hemivagina, renal agenesis, and some occasion even the presence of endometrial cysts in the ovaries. Our two older patients were clinically asymptomatic and presented right kidney agenesis and uterus didelphys, although they didn't have obstructed hemivagina with hematocolpos, however, both didn't have their menarche yet.

Surgical treatments depend on excision of the vaginal septum or its incision and marsupialization, which ensures outflow of the menstrual blood and considerably decreases the pain associated with hematocolpos.

Conclusions: Herlyn-Werner-Wunderlich syndrome is a rare anomaly with potential short and long-term complications. The diagnosis is likely to be missed, due to the absence of specific findings upon physical examination.

Thus, reporting such cases increases awareness of the syndrome and helps to achieve early diagnosis, in order to relieve acute symptoms, preserve normal fertility and prevent several medical complications.

Vesicoureteral reflux imaging in paediatric patients: can cystosonography replace micturating cystourethrogram?

MS Prevedoni¹, P.Lomoro², F. Ballati¹, L.Lungarotti¹, A.Citterio³, L.Preda¹

1. IRCCS Policlinico San Matteo pavia
2. Ospedale Valduce Como
3. Libero professionista

Objective: To demonstrate reliability of sonocistography as a strong alternative to micturating cystourethrography in the diagnosis and follow up of vesicoureteral reflux in infants and children.

Methods: A total of 97 pediatric patients ((49-boys and 48-girls), with an age range of 3 months-14 years, been recruited in the study. Each patient underwent a cysto-sonography by intravesical introduction of contrast agent (1ml-SonoVue), immediately followed by traditional cystourethrography. Passive and active vesicoureteral reflux was sought after spontaneous urination or abdominal press operation. The considered parameters have been the presence or

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

absence of VUR, the grading of VUR, the mono- or bilaterality of it and its active or passive nature.

We considered the number of patients and of pielo-ureteral units.

The reference gold standard has been micturating cystourethrogram.

Results: We have demonstrated the high values of sensibility of sonocistography in detecting VUR, with a negative predictive value of 100%, and a high sensivity, ranging from 81 to 92%.

Conclusion: The data seem to highlight the validity of the sonocystographic technique as an alternative to voiding cysturethrography in the diagnosis of vesicoureteral reflux in pediatric age, in agreement with other studies in the literature. The technique is highly sensitive and absolutely specific.

The study presented shows the criticalities of the low sample number requiring further data in favor of the technique.

High-resolution chest CT in children with severe asthma

Federica de Matteis¹, M. S. Prevedoni Gorone², M. de Filippo², A. Licari², L. Preda²

1. IRCCS ICS Maugeri Pavia

2. IRCCS Policlinico San Matteo Pavia

Purpose or Learning Objective: Central precocious puberty (CPP) is characterized by idiopathic activation of the hypothalamic-pituitary-gonadal axis, with appearance of secondary sexual characteristics in females before the age of 8 years, early ovarian and uterine development, accelerated growth rate and bone maturation, with short final stature. Hence, the importance of diagnose and pharmacologically treat girls with CPP. Clinical-laboratory-instrumental monitoring is necessary to assess therapeutic efficacy, specifically with pelvic ultrasound, simple and non-invasive, as the ultrasound parameters are reduced after 3 months of treatment. The uterine artery pulsatility index (IP), is indicative of actual pubertal activation, with cut-off=4.6; IP values, in fact, are lower in girls with CPP. Yet, not existing any studies on the role of IP in follow-up so far, we aim to study the potential role of IP as index of therapeutic efficacy.

Methods or Background: We performed a first pelvic ultrasound at the beginning of our observation and a second one after 12 months. We then compared the IP values of 20 patients on treatment with the ones of 24 patients on monitoring. As a continuous variable the IP values

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





were defined as the mean value \pm SD; the t-test was used for comparison between the two groups.

Results or Findings: After one year, the mean of the IP value in the treatment group increased from 4.16 \pm 1.19 to 5.18 \pm 1.39, statistically significant ($p < 0.05$); in the monitoring group, the mean IP value decreased from 4.52 \pm 1.28 to 4.33 \pm 1.45. In addition, 12 treated girls (60%) regressed from a pubertal-type uterine artery flow pattern to a pre-pubescent one.

Conclusion: Our results suggest the usefulness of IP as an additional index of therapeutic efficacy.

Limitations: Our study limitation was the smallness of the sample.

Use of ultrasound prior to emergency scrotal exploration- experience at a UK tertiary centre

Timothy Strangeways¹, Meraj Ondhia¹, Srikrishna Harave¹, Divya Vaid¹

1. Alder Hey Children's Hospital

Background: UK and European guidelines differ in their recommendations when investigating clinically equivocal testicular torsion [1,2]. Current UK guidelines [2] recommend that imaging should not be performed in patients with clinical features suggestive of torsion. Negative surgical exploration is preferable to a missed diagnosis as all imaging studies have a false-negative rate and there is a low threshold for going to surgery. European guidelines have recommended that ultrasound should only be performed in equivocal cases when the likelihood of torsion is low. Given the disparity in recommendations we sought to analyse our local practice at a major children's hospital.

Methods: 50 consecutive cases of patients who underwent emergency scrotal exploration were retrospectively identified RIS (CRIS, wellbeing software). Surgical findings were obtained via the operation note (Meditech). Elective scrotal explorations were excluded.

Results: 50 patients were included from January 2019 to July 2020. There were 28 cases (56%) considered to be 'true positives' which included testicular torsion (8/50), torted hydatis of

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



morgagni (17/50), intermittent torsion (2/50) and bell-clapper (1/50). 12/50 (24%) had nil acute findings on surgical exploration and deemed true negatives. Other causes identified on exploration included epididymitis (1/50), epididymo-orchitis (7/50), idiopathic scrotal oedema (1/50) and indeterminate possible epididymo-orchitis (1/50) - constituting the remaining 20% of the caseload. Only one case from our dataset had a pre-operative ultrasound scan that did not identify any acute pathology and on surgical exploration found to have epididymitis.

Conclusion: In paediatric patients who underwent emergency scrotal exploration there is low utilisation of preoperative ultrasound (1 ultrasound in 50 consecutive cases). This is entirely in keeping with current UK guidelines. A negative exploration of 24% in our centre compares favourably with other major Centres in the UK (3). Imaging could be considered for a small number of children after assessment by a senior clinician, in late presenters or in those with atypical features. Our data from a major children's hospital in northwest England supplements findings from the literature [3] that there is low incidence of testicular torsion in emergency scrotal explorations and that pre-operative ultrasound is rarely used.

References:

1. European guidelines - ESPR Uroradiology Taskforce—imaging recommendations in paediatric uroradiology, part VIII: retrograde urethrography, imaging disorder of sexual development and imaging childhood testicular torsion | SpringerLink
2. UK guidelines - torsion-commissioning-guide.pdf (england.nhs.uk)
3. Gopal, M. et al. (2021) “Emergency scrotal exploration in children: Is it time for a change in mindset in the UK?,” *Journal of Pediatric Urology*, 17(2). Available at: <https://doi.org/10.1016/j.jpurol.2020.11.029>.

Our experience with contrast-enhanced voiding urosonography in paediatric patients

Pedro Riesenberger¹, Vera Brazão Carvalho¹, Ana Forjaco¹, Rita Carneiro¹, Eugénia Soares¹

1. Hospital de Dona Estefânia - Centro Hospitalar Universitário de Lisboa Central

Introduction and objective: Contrast-enhanced voiding urosonography (ce-VUS) is a technique that utilizes sonographic contrast to study the lower urinary tract, particularly to detect vesicoureteral reflux. We aim to provide a review of the technique and imaging findings of ce-VUS studies based on the experience at our institution.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Material and Methods: Topic review based on bibliographical research and selection of case images from a paediatric university hospital. Whenever possible imaging findings are correlated with clinical data and other imaging studies.

Results: Vesicoureteral reflux is defined as an abnormal flow of urine from the bladder to the upper urinary tract and is an important factor for the development of upper urinary tract infections in children. In the past voiding cystourethrography (VCUG) has been considered the primary imaging method to study children with suspected vesicoureteral reflux. Ce-VUS has emerged as a technique comparable to VCUG. Its main advantage is the absence of ionising radiation, preventing long term detrimental effects. Occasionally, other abnormalities commonly associated with vesicoureteral reflux, such as duplication of the renal collecting system or posterior urethral valves, can be detected with ce-VUS. Key imaging findings are addressed and revised.

Conclusions: Ce-VUS is a valuable imaging tool to study vesicoureteral reflux and prevents children from being subjected to ionising radiation. Paediatric radiologists should be familiar with the technique and key imaging findings.

Unusual Case of an IgG4-related disease

Stevan Nikšić¹, Peter Slak¹, Senja Mali Brajović¹, Domen Plut¹

1. University medical center Ljubljana

Introduction: Immunoglobulin G4 (IgG4)-related disease is a systemic disease that is characterized by fibro-inflammatory lesions rich in IgG4-positive plasma cells. Its pathogenesis is poorly understood, but findings are consistent with both an autoimmune and an allergic disorder. Imaging plays an important role in demonstrating infiltration and enlargement of involved organs. Patients often present with subacute development of a mass in the affected organ, sometimes mimicking a neoplastic process. IgG4-related disease usually shows a marked response to corticosteroid therapy. We present an unusual case of an IgG4-related disease.

Case presentation: A 13-year-old boy was referred for abdominal ultrasound because of dysuria. Abdominal ultrasound showed a well-defined homogeneously hypoechoic mass deriving from the outer gastric wall in the antrum of the stomach. Color Doppler revealed

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

moderate vascularity within the lesion. MRI confirmed the solid tumor within the gastric wall. There were no signs of enlarged lymph nodes or distant metastasis. The mass had intermediate signal intensity on T1-weighted imaging, intermediate-to-low signal intensity on T2-weighted imaging, no restriction on diffusion-weighted imaging, and homogeneous enhancement on post-contrast T1-weighted imaging. Endoscopic fine needle aspiration was performed. Histopathologic analysis showed sclerotic, fibrosing spindle cells, suggesting the diagnosis of a gastric desmoid fibromatosis – a benign, potentially locally aggressive lesion. US follow-up was indicated. Control US performed in 3 months showed lesion growth, which led to surgical removal of the tumor. Histopathologic analysis showed a dense lymphoplasmacytic infiltrate, a storiform pattern of fibrosis, and obliterative phlebitis, all of which are signs of IgG4-related disease.

During this time, urethrography was also performed. Urethrography showed a stricture about 1 cm in length in the bulbar part of the urethra. Due to IgG4-related disease of the stomach, corticosteroid therapy was initiated which significantly improved dysuria. The follow-up urethrography showed no stricture.

Conclusion: We presented a case of an IgG4-related disease, which manifested with dysuria as a result of a lesion in the bulbar part of the urethra and with asymptomatic lesion in gastric wall. Although definitive diagnosis requires histopathologic analysis, radiologists should be familiar with its possible clinical and imaging manifestations to avoid unnecessary surgical interventions.

Comparison of renal allograft function in pediatric and young adult patients to renal function of individually matched healthy controls using ASL MRI perfusion technique

Tijana Radovic^{1,2}, Milica M. Jankovic³, Mirjana Kostic², Brankica Spasojevic², Mirjana Cvetkovic², Ivana Gojkovic⁴, Polina Pavicevic^{1,2}

1. University Children's Hospital, Department of Radiology, Belgrade, Serbia
2. University of Belgrade, Faculty of Medicine, Belgrade, Serbia
3. University of Belgrade, Faculty of Electrical Engineering, Department of Signals and Systems and BioMedical Instrumentation and Technologies (BMIT), Belgrade, Serbia

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



4. University Children's Hospital, Department of Nephrology, Dialysis and Transplantation, Belgrade, Serbia

Background: Perfusion represents a blood flow at the level of the tissue capillary bed and determines the delivery of nutrients and oxygen to the tissue. Renal perfusion is also a key determinant of glomerular filtration, therefore, a central measure of renal function monitoring. The development of a non-invasive and reliable method for renal perfusion estimation that would reflect glomerular filtration rate (GFR) would significantly improve on-time identification of potential allograft injury.

We aimed to discriminate renal allografts with impaired function in paediatric and young adult patients by measuring cortical renal blood flow (cRBF), as well as a comparison with cRBF values of healthy controls using magnetic resonance imaging arterial spin labelling (ASL-MRI).

Material and Methods: We performed 3D GRASE FAIR ASL-MRI on 1.5T in 20 paediatric and young-adult allograft patients (10 male, median age 15.5yrs.) and 20 individually matched healthy controls, covering the whole kidney region with 8 slices in order to calculate cRBF on parametric maps. It was correlated to calculated GFR and compared between patient groups with good ($GFR \geq 60$ mL/min/1.73m²) and impaired allograft function ($GFR < 60$ mL/min/1.73m²) as well as with healthy controls.

Results: cRBF in the patient group ranged between 85 and 335 mL/100 g/min (mean 190.05 ± 67.62 mL/100 g/min). Mean cRBF in patients with good allograft function was significantly higher than in patients with impaired function (225.91 ± 64.38 vs 146.22 ± 41.84 mL/min/100g, $p=0.005$), showing a highly significant correlation with GFR in all subjects ($r=0.64$, $p=0.002$). In healthy controls, mean cRBF was significantly higher than in patients with poor allograft function (322.00 ± 121.36 vs 146.22 ± 41.84 ml/100gr/min, $p=0.002$) and showed no difference to patients with stable function (322.00 ± 121.36 vs 225.91 ± 64.38 ml/100gr/min, $p=0.056$). ROC curve of cRBF for distinguishing allografts with impaired function from allografts with good function showed high area under the curve $AUC=0.859$, with $p=0.007$ and overall good sensitivity of 81.8% and specificity of 66.7%

Conclusion: Cortical renal blood flow as measured by ASL-MRI perfusion technique is considered completely safe and non-invasive, with high potential in assessing renal allograft function.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Innovation

The Clinical and Surgical Applications of Virtual Reality in Radiology: a Scoping Review

Henrique Coimbra Baffi, Tolulope Opa., Brian Tsang., Aaryan Gupta., Andrea Schwarz Doria., Mirkamal Tolend

Purpose: To scrutinize the current status of knowledge on non-educational applications of VR and AR in radiology; addressing their clinical and surgical applications, cost-effective strategies compared to status quo and benefits of use in proposed populations.

Methods and Materials: MEDLINE, EMBASE and Cochrane databases were used in a literature search for studies using VR/AR as a clinical tool, interventional aid or alternative therapy. Study characteristics were described, and quality of reporting was evaluated using STARD guidelines.

Results: Ten papers were included, having 320 pediatric and adult patients with a wide range of pathologies, from knee pathology to back pain, cerebral and craniomaxillofacial abnormalities, post-fracture, and malignancies. There was great variability in study designs: 6/10 (60%) being descriptive case series; 2/10 (20%), randomized clinical trials; 1/10 (10%), a cross-sectional design and 1/10 (10%), a prospective cohort design. The uses of VR in this review were as a clinical tool for pre-surgical planning (40%), intra-operative assistance (30%), anxiety reduction (10%), assessment of effectiveness of balance training in chronic back pain (10%), and supplemental assistance to ventriculocopy (10%). STARD scores of primary studies were overall poor (averaging 12, maximum, 30). 7/10 (70%) papers yielded STARD scores ≤ 15 . Inter-rater reliability of STARD was substantial (intraclass correlation coefficient, 70% (95% CI, 23%-91%). No information on VR/AR cost-effectiveness in patient management was available in included papers. Most primary studies showed better outcomes in VR groups than control groups, or in clinical and surgical outcomes.

Conclusions: Although study results point towards a positive uptake in the use and utility of VR/AR in clinical and surgical settings, substantial improvement in the quality of reporting of methods is urgently needed.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Clinical Relevance/Application: Preliminary field studies show VR's clinical and surgical utility, encouraging further research. Nonetheless, a coordinated effort is required to design and conduct high-quality VR/AR studies.

Miscellaneous

Case report: Orbital hemangioma

Dubravka Milutinovic¹, Natasa Milcanovic¹

1. University Children Hospital, Tirsova 10, Belgrade

Background: Orbital hemangioma are common in children, but are rarely found in neonates. They are usually smaller in size and are most often discovered as an incidental find. Capillary hemangiomas of the orbit also known as strawberry hemangiomas, on account of its coloring, or orbital infantile hemangiomas are the most common orbital tumors of infancy. Usually present as a periorbital subcutaneous mass. In a minority of cases the tumor is deep to the skin overlying the orbit and has a more variable presentation: diplopia, ptosis, proptosis.

Material: A male patient, three months of age, first went to the eye clinic due to protrusion of the right eyeball. Based on the clinical picture (increased temperature, pain, redness, tearing, oedema) but also elevated values of inflammation (leukocytes, CRP), he treated as an eye infection. Due to protrusion of the eyeball that did not recede, after a month they come to the University Children Hospital for an emergency radiology diagnostic- computed tomography (CT) of the orbit and ultrasound.

Methods: The CT examination was done post-contrast, where in the complete right orbit is observed loose connective tissue that uniformly, intensively opacifies, which displaces the orbital muscles and discretely suppresses the optic nerve and pushes the eyeball forward and lateral. Based on the radiological picture that most indicated diagnosis was the orbital hemangioma. But there was still a discrepancy between the clinical and radiological picture, a supplementary diagnostic examination was performed - ultrasound examination of the periorbital region (included lower eyelid). The ultrasound picture show solid, hyperechogenic change (mass) with a clear color doppler signal that indicates a hemangioma of the right orbit.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Results: After radiology diagnostic, diagnosis was clear-orbital hemangioma. After a few days, the patient received adequate treatment by an ophthalmologist (propranolol) where a reduced hemangioma was soon noticed, which completely receded in a few months.

Conclusions: Radiology imaging is essential for narrowing the diagnostic considerations and determining the most appropriate management strategy for orbital hemangioma.

Extensive deep vein thrombosis (DVT) in May Thurner syndrome

Dušan Banovac¹, Nevena Lazović¹, Zorica Joković¹

1. Radiology department, University Children's Hospital, Belgrade, Serbia

Objective: May-Thurner syndrome is a rare vascular anatomic variant that represents a compression of the left common iliac vein from the right common iliac artery. It was described in 1957. by May and Thurner. While over a half patients with compression are asymptomatic, some may manifest most likely as DVT and its sequelae. Computed tomography (CT) venography is considered a “gold standard“ in diagnosing May-Thurner syndrome.

Case report: We present a rare case of a 16-year-old, male patient with May-Thurner syndrome manifesting as a first episode of acute and extensive DVT.

Patient was admitted to our clinic with swelling and pain in his left leg, five weeks after the lateral fibular malleolus fracture. Laboratory showed elevated D-dimer, with normal CRP and blood count. Ehosonography showed an absence of blood flow and intraluminal masses in the left common iliac vein, left femoral, popliteal, and crural veins.

We performed and analyzed contrast-enhanced abdominal and lower extremities CT venography. Indirect CT venography was performed in two phases: arterial with 25s delay, and late venous phase with 120s delay.

CT venography showed signs of compression of the left common iliac vein, as well as intraluminal thrombotic masses inside the left common iliac vein, femoral vein, popliteal, and crural left veins.

Conclusion: This was the first case of DVT caused by May-Thurner syndrome, to our knowledge, in the last 10-year period in our clinic. Considering the patient's prior injury, as well as positive family history of DVT, and our lack of experience, at first we were unsure of

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

the diagnosis, however, due to well-performed CT venography we were able to get the right diagnosis. After that patient was transferred to a vascular clinic for further treatment.

UIOs-unidentified inguinal objects. Imaging exploration overview of inguinal region in neonates and children

Evangelia Manopoulou¹, Loukia Tzarouchi¹, Georgios Oikonomoulas¹, Konstantinos Iosifidis¹, Georgia Papaioannou¹

1. Department of Pediatric Radiology, Mitera Children's Hospital, Athens, Greece

Objective: To present the imaging approach in inguinal region swelling in neonates and children.

To consider the differential diagnosis and point out the imaging characteristics of the various entities.

Methods-materials: We examined neonates and children who presented with signs of inguinal swelling or palpable mass, with or without tenderness.

Ultrasound was the modality of choice in evaluating the inguinal region. In one case, MRI was necessary for further exploration.

Results: A number of inguinal canal pathologic entities were recognized and are presented, such as: hydroceles in boys (communicating or not), hydroceles of the canal of Nuck in girls, inguinal testicle (cryptorchidism), spermatic cord cyst, omental and bowel hernias and herniation of ovaries and uterus. We also noted a case of dilated inguinal region due to circulation of free air bubbles through the canal and hemiscrotum in a preterm neonate with bowel perforation and another, due to a herniating abdominal tumor. Extracanal inguinal findings include inflammatory and infiltrated neoplastic lymphnodes and a case of a femoral artery pseudoaneurysm after catheterization.

Conclusions: Swelling of inguinal region is a common complaint in pediatric patients. Ultrasound is the modality of choice in identifying and differentiating between the various pathologic entities. The majority of inguinal region lesions is of intracanal location, due to patent processus vaginalis. Extracanal pathology is less common but should be considered in differential diagnosis.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Imaging profile of juvenile recurrent parotitis

Filipa Lima Coelho¹, Catarina Carvalho¹, Pedro Maganinho¹, Joana Maciel¹, Manuela França¹

1. Centro Hospitalar Universitário do Porto

Purpose: Juvenile recurrent parotitis is defined as recurrent inflammatory parotitis in children of unknown etiology. It is a rare condition characterized by multiple episodes of parotid swelling and/or pain associated with fever or malaise over a period of years. The aim of this study was to investigate the imaging profile of children with recurrent parotitis.

Methods and Materials: Pictorial review of typical alterations of the parotid parenchyma secondary to recurrent parotitis in the pediatric population, by doing a retrospective analysis of ultrasound and sialography scans performed in our institution, in the last two years.

Results: Most recurrent parotitis etiologies in pediatric age are benign, and the most common diagnosis in our population is juvenile recurrent idiopathic parotitis since the universal introduction of a vaccine for mumps (another cause of parotitis).

Juvenile recurrent parotitis is characterized by a non-obstructive and non-suppurative nature, and commonly begins between 3 and 6 years of age. Although most of the cases are idiopathic, juvenile recurrent parotitis might be the first presenting symptom of an underlying variable immunodeficiency, HIV infection and Sjogren's syndrome.

This pathology is usually unilateral, but can occur bilaterally with symptoms, usually more prominent on one side. Even though most of the cases are idiopathic, juvenile recurrent parotitis might be the first presenting symptom of an underlying variable immunodeficiency, HIV infection and Sjogren's syndrome.

Although the diagnosis is mostly based on clinical features, imaging can be used to confirm it and evaluate complications.

Acute and non-acute parotid ultrasound predominantly showed the presence of a heterogeneous gland, with multiple hypoechoic areas. Sialography was requested for imaging the extra- and intraglandular duct system, with high spatial resolution. Most of the sialography studies performed suggested chronic parotitis, showing Steno's duct irregularity and focal strictures, and the presence of punctuate and globular sialectasis.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Conclusions: Although in most of the patients, the symptoms resolve spontaneously after puberty, in severe cases destruction of the glandular parenchyma with a diminution of its functionality can occur. Adequate imaging diagnosis and characterization is essential to prevent further complications.

Radiological signatures to differentiate hepatocellular carcinoma from hepatoblastoma in children over 5 years of age

Gozde Ozer¹, H. Nursun Ozcan¹, Burak Ardıçlı², Tezer Kutluk³, Berna Oguz¹, Mithat Haliloglu¹

1. Department of Radiology, Hacettepe University Faculty of Medicine, Ankara, Turkey

2. Department of Pediatric Surgery, Hacettepe University Faculty of Medicine, Ankara, Turkey

3. Department of Pediatric Oncology, Hacettepe University Faculty of Medicine, Ankara, Turkey

Background: Hepatoblastoma (HB) accounts for two-thirds of primary malignant liver tumors in children and mostly occur under the age of five. Hepatocellular carcinoma (HCC) is the second most common primary malignant liver tumor, often seen after the age of ten. Although some characteristic imaging findings have been described in both HB and HCC, it is difficult to distinguish between these two tumors when a patient is over the age of five.

Materials and methods: The radiology archives were searched to assess HB and HCC patients older than 5-year-old between 2007-2022. Initial MRIs and/or CTs of all patients were evaluated for the presence of background liver disease, signal characteristics of lesions, contrast enhancement pattern, presence of necrosis, central scar, tumor capsule, and portal/hepatic venous involvement. Maximum transverse diameter, PRETEXT stages and annotation factors were noted. In addition to imaging findings, initial symptoms, age at diagnosis, serum alpha-fetoprotein (sAFP) levels, histopathological results, and follow-up data were reviewed.

Results: A total of 19 children (16 boys, 3 girls, mean age=10) were included. There was no significant difference between HB (n=9) and HCC (n=10) groups in terms of age and gender. PRETEXT stage III and IV were more common in HB-group (n=2 and n=6, respectively), and

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

stage I and II were more common in HCC-group (n=3 and n=4, respectively); albeit this failed to reach statistical significance (p=0.053). sAFP values were significantly higher in the HB-group (sAFP-mean=235068 ng/ml) compared to the HCC-group (sAFP-mean=34009 ng/ml) (p=0.002). Tumor size was found higher in the HB-group (mean=133 mm) than the HCC-group (mean=87 mm); however, there was no statistically difference (p=0.06). Also, there was no difference between two groups in presence of necrosis, central scar, and tumor capsule. Initial MRI was available for 6 patients with HB and 7 patients with HCC, and there was no difference regarding ADC-values (HB-group-mean=0.8x10⁻³ mm²/s; HCC-group-mean=1x10⁻³ mm²/s, p=0.13).

Conclusions: In this study, PRETEXT stage and sAFP values were found higher in the HB-group. Although it is difficult to distinguish between HB and HCC with clinical features and imaging findings in patients over 5 years of age, these findings may help in differential diagnosis.

Congenital Nasal Pyriform Aperture Stenosis - The Case Series

Dr Jelena Grgur¹, Dr Gordana Milak¹, Dr Darko Dožić¹

1. Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, Novi Sad, Serbia

Background: Congenital nasal pyriform aperture stenosis is a very rare and potentially lethal form of airway obstruction in newborns. It is due to bony overgrowth of the nasal lateral process of the maxilla. This anomaly may present itself as an isolated malformation or may be associated with other cranial-facial anomalies.

Materials and methods: Four full-term infants aged 0 days to 3 months were admitted to the pediatric clinic in the period from 2014 to 2023: three infants were referred with signs of neonatal respiratory distress and choanal atresia, and an infant due to acute nasopharyngitis. In all four patients, respiratory problems were registered in the form of cyclic respiratory distress, noisy, difficult nasal breathing, and nasal discharge. The dominant finding was the nasal (sub)obstruction. Computed tomography (CT) was performed in all the patients.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Results: Non-enhanced CT of the facial bones and part of the endocranium was performed. All patients were diagnosed with stenosis of the pyriform aperture of less than 8 mm (5,3 to 7,4mm). In two patients, a triangulated hard palate was also present, and in three infants a prominent solitary central incisor of the maxilla was detected. Three out of four patients were treated surgically, while one patient was treated conservatively with air humidification and local corticosteroid therapy. Sufficient breathing is established in all patients after therapy.

Conclusion: Infants are obligate nasal breathers, and any degree of nasal airway obstruction can cause significant aerodigestive symptoms. Whereas soft tissue edema is the most common cause of bilateral nasal obstruction, the differential includes a list of rare diagnosis, including bilateral choanal atresia, midnasal stenosis and congenital nasal pyriform aperture stenosis.

Role of MRI in imaging of infantile hemangioma

Spasic Jelena¹, Stokanovic Vesna¹, Denic Sasa¹, Mladenovic Sanja¹

1. Center for radiology, University Clinical centre Nis, Serbia email: sp.jelena@gmail.com

Purpose/Objective/Background: Infantile hemangioma is the most common benign vascular tumor found predominantly in the head and neck region. During the first year of life hemangiomas tend to have progression in size with involution happening during the early childhood. Rarely hemangiomas need treatment, surgical or other, mostly when presented with complications such as bleeding or when massively enlarged. Infantile hemangiomas most likely occur in female. The aim of this case report is to present an infant with bleeding hemangioma of head and neck and its response to treatment.

Methods: The examinations were performed on MRI GE (General Electrics) 3T SIGNA PIONEER. T2- weighted, T1-weighted, diffusion-weighted (DWI), T1-weighted contrast enhanced images were used in protocol.

Materials: The patient is three-months-old male who underwent MRI examination in Center for radiology in University Clinical center Nis.

Results: Our patient presented with large hemangioma of the neck region on the left side with occupation of the skin and the left ear and it extended through the back skin. Another similar lesion is found in neck subcutis on the left side and it possible extended in the parotid gland.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Almost full regression of the hemangioma is presented after treatment with beta blockers year later on followup scan.

Conclusion: Magnetic resonance imaging (MRI) is a modality of choice for evaluation of infantile hemangioma in the head and neck region with atypical clinical appearance or when surgical treatment is needed. Initial MRI examination and further follow-up is important for identification and characterization of the hemangioma.

Paediatric Occipital Lymph Node Normal Reference Range Derivation

Joy Barber¹, Charlotte Kendall², Steven Jarvis³

1. Department of Radiology, St George's Hospital, Blackshaw Road
2. Radiology Registrar, Department of Radiology, St George's Hospital, London
3. Superintendent Sonographer, Department of Radiology, St George's Hospital, London

Purpose: At our centre, we receive approximately 300 neck ultrasound requests per year from the community for persistent soft tissue lumps, likely lymph nodes. Where a specific palpable lymph node is indicated by the parents at the time of scanning, it is most commonly a level 5 cervical lymph node (36%), followed by occipital nodes (25%).

Whilst reference ranges have recently been published for cervical nodes levels 1-6 (Spijkers et al, PedRad 2020), there are no published reference ranges for occipital nodes – which in our experience tend to be much smaller.

We therefore set out to establish reference ranges for occipital lymph nodes.

Methods: Occipital lymph nodes were measured on paediatric MRI head studies performed for non-oncologic, non-infective/inflammatory indications. Studies were also excluded if a ventricular shunt was in situ, or if the image resolution did not allow clear visualisation of the nodes (normally due to feed and wrap technique with no surface coil).

The standard MRI protocol included axial FLAIR 4mm, DWI 4mm, T2 4mm, SWI, Coronal T2 3mm, Sag T1 SE.

Results: Preliminary results of 100 children (54 male) demonstrates a mean short axis measurement of 3.5mm for occipital lymph nodes, median 3.4mm (IQR 3-4.1). No significant difference was seen between right and left, age groups or genders.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





Conclusions: Here we present the first reference ranges for occipital lymph nodes in children.

Musical Interventions in the Radiology Suite: A Call to Look into Pediatric Radiology

Luis Octavio Tierradentro-Garcia, MD¹, Karen I. Ramirez-Suarez, MD¹; Monica Miranda Schaeubinger, MD¹

1. Department of Radiology, Children's Hospital of Philadelphia

Purpose: To evaluate the existing evidence on music's role in patients' outcomes while undergoing radiological diagnostic exams or interventional procedures.

Materials and Methods: We conducted a systematic search using MEDLINE, EMBASE, Scopus and Web of Science for studies published until February 28, 2023 in concordance to PRISMA guidelines. We included prospective studies that evaluated the effects of music on patients undergoing radiological diagnostic exams and/or interventional procedures. We excluded reviews but manually searched their references to include original studies that were not selected during the primary search. Outcomes included subjective levels of comfort (e.g., anxiety and pain levels), dose of sedation, and vital signs. Titles/abstracts were reviewed by two researchers who were blinded to each other's responses; a third researcher resolved any discrepancies. We summarized the types of study, types of intervention, and outcomes.

Results: Title/abstract screening was conducted for 659 remaining studies after deleting duplicates. Sixty-two full-text articles were reviewed for determining inclusion. A total of 45 studies were included for qualitative synthesis, of which 18 (40%) were published in radiology journals. Studies were published between 1990 and 2023, 62% published in the past ten years. Most studies (n=19, 42.2%) were conducted in the USA. Coronary angiography was the most common procedure (n=13, 28.9%), followed by breast imaging diagnostic and interventional studies (n=8, 17.8%). Anxiety level was the subjective outcome most commonly evaluated (n=37/45), and music intervention reduced anxiety in 25/37 (67.6%) studies.

Only 6 studies (13.3%) included pediatric patients; the modalities for these studies included: interventional radiology (n=1), ultrasound (n=1), MRI (n=3), head CT (n=1). Only one of the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

studies was published in a radiological journal. Overall, results showed that music could decrease sedation requirements and increase comfort.

Conclusions: Music is an inexpensive, accessible tool that can be used in the radiology suite to help decrease discomfort in patients undergoing diagnostic exams or interventional procedures. While most studies observed that music helps decrease the periprocedural levels of self-reported anxiety in adults, the question remains unanswered for the pediatric population due to the paucity of literature and the limited sample size of the current studies.

Intranodal MR lymphangiography of central lymphatic pathways - how we do it and a case report

Matija Žerdin, dr. med.¹, Aleš Slanič, dr. med.¹, Simona Plajnšek Vesenjāk, dr. med.¹, Lea Gril, dr. med.¹, Sonja Golob Jančič, dr. med.¹, prof. Nataša Marčun Varda, dr. med.¹

1. UKC Maribor

Background: Lymphatic flow disorders include a wide range of abnormalities that can be congenital or acquired. In the developed world, lymph flow disorders in children are most often associated with congenital heart defects and heart surgery, less often with complex anomalies of the lymphatic system. In adults they are most often due to malignant diseases, worldwide the most common cause are parasitic infections.

Lymphoscintigraphy was historically used for assessment of the peripheral lymphatic pathways but as it has low spatial resolution it is not well suited for imaging of central lymphatic pathways. Dynamic contrast-enhanced magnetic resonance lymphangiography (DCE MRL) has been developed as a non-ionizing alternative, which has much better time and spatial resolution and is better suited for imaging of central lymphatic pathways.

Methods and materials: We used intranodal dynamic contrast-enhanced magnetic resonance lymphangiography (IN DCE MRL), which allows visualization of central lymph flow disorders and is used in diagnosis of plastic bronchitis, protein loss enteropathy, chylothorax and chylopericardium and related conditions. Beside anatomic visualization the method also allows for functional assessment of lymph flow direction and drainage. The IN access was obtained using ultrasound and verified either using doppler or CEUS.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Results: We first present the IN DCE MRL technique and illustrate it with a case of a 16-year-old girl with a generalized lymphatic anomaly (GLA) with consequent disruption of lymph flow and clinically evident chyluria, chylothorax and chylous ascites.

Conclusions: DCE MRL is an excellent method allowing anatomic as well as functional assessment of the central lymphatic pathways in children as well as in adults.

What can the National Museum of Belgrade teach us about Radiology?

Michael Jackson¹

1. NHS Lothian

Background: International conferences offer outstanding opportunities for education, innovation and collaboration within the meeting venue, but can we also seek to enhance our understanding of our work, our patients and ourselves through the culture available within the hosting city? The National Museum in Belgrade, founded in 1844, houses a wealth of archaeological artifacts and art from pre-history to the 21st century. This presentation will demonstrate the relevance of selected artworks housed within this celebrated institution to paediatric radiology.

Methods / Materials: Utilising the National Museum catalogue via online resources, several items and artworks with thematic, technical or perceptual relevance to radiology were identified.

Results: Works from numerous historical eras were selected, but with a predominance from the late 19th and early 20th century. These include: a ceramic vase from 6th century BCE, the Rosette architectural motif found in Serbian churches of the late Middle Ages, *Fugitives from Herzegovina* by Uroš Predić (1889), *Female head in a goblet* by Odilon Reon (c1895), *Self-Portrait* by Nadezda Petrović (1907), *The Shepherdess* by Sava Šumanović (1924), *Co-op III* by Hannes Meyer (1925), and *Group Family* by Marko Čelebonović (1931). Collectively,

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

these works have much to teach us about how images are constructed, the visual processes involved in how we perceive them, the selectivity of what is (and is not) included within an image, together with powerful humanitarian messages, of profound importance within our role as healthcare professionals.

Conclusion: ESPR delegates will greatly benefit from this “crash-course” in Serbian culture, gaining an appreciation of the relevance of art history to the principles and practice of paediatric radiology.

Dermoid cysts in infants: can we avoid a GA MRI?

Dr Olivia Anderson¹, Dr Michael Jackson¹

1. Radiology Department, Royal Hospital for Children and Young People, 50 Little France Crescent, Edinburgh, EH16 4TJ

Aim/Background: Dermoid cysts are benign developmental lesions that occur on the head and neck region in children with an incidence ranging between 1.6 – 6.9%^[1]. MRI has been utilised to exclude intracranial extension prior to surgical resection, but typically requires general anaesthesia in young children. A number of cases in which GA MRI was conducted without prior ultrasound prompted review of the imaging pathway in our institution, with the objective of developing a protocol to eliminate inappropriate imaging in this context.

Methods: Retrospective analysis of all head US, MRI and CT studies performed between 01/01/2012 – 01/01/2023 containing the keyword ‘dermoid’ in patients younger than 3 years old was undertaken. Data was assessed to identify the diagnostic pathway performed in each case and whether there was any evidence of intracranial extension.

Results: 137 studies were identified. 89 (66%) of these had US only evaluation. 99 dermoid cysts were confirmed in total, of which 69 diagnoses were made after US, 12 after MRI only, 1 dermoid cyst was confirmed on CT only and 17 were diagnosed after a combination of

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





imaging modalities, the most common combination being MRI after US. In 26 cases the initial diagnosis of dermoid cyst was altered following imaging, 13 of which had ultrasound alone. Across all studies, there was no confirmed intracranial extension.

Conclusion: On the basis of our experience and published literature we suggest that external angular dermoid cysts showing typical features do not require cross sectional imaging^[2] Lesions located close to the midline may require cross-sectional imaging but ultrasound should be performed in the first instance. Low-dose, rapid acquisition CT may offer a means of excluding an associated skull defect without requirement for general anaesthesia.

References:

- 1) Al-Khateeb TH, Al-Masri NM, Al-Zoubi F. Cutaneous cysts of the head and neck. Journal of oral and maxillofacial surgery. 2009 Jan 1;67(1):52-7.
- 2) Mead J, Kirkpatrick J, Murdoch J, Stringer MD. Is pre-operative imaging of external angular dermoid cysts in children necessary?. Journal of Paediatrics and Child Health. 2022 Aug;58(8):1420-4.

Neck masses can be a pain in the neck: A selection of interesting cases requiring a multimodality approach.

Samuel Alsford¹, Srikrishna Harave¹

1. Radiology Department, Alder Hey Children's Hospital

Palpable neck masses are common in the paediatric population and can be challenging to diagnose given the broad differential and need to exclude malignancy.

Ultrasound has established itself as the initial imaging modality of choice and in many cases can provide a definitive diagnosis. More complex cases and/or ones with atypical initial imaging features may however require a multimodality approach. MRI provides further characterisation and can help to establish extension into the deep neck spaces. CT is less common, but may be used in the acutely unwell patient if there is a concern regarding abscess formation. Nuclear medicine can also play a role in select cases.

Here, we present five varied and interesting cases of children presenting with a neck mass, which serve to highlight the broad range of pathologies one may encounter in this cohort. Pathologies include an infected branchial cleft cyst, parathyroid adenoma, plexiform

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

ganglioneuroma, plunging ranula and ectopic thymic tissue. For each, we discuss the clinical presentation, imaging approach and findings, and details of the patient's management with a view to establishing key learning points for the reader.

We hope that this poster will be entertaining and instructive and serve as a useful reminder to those radiologists involved in the imaging of neck masses in children in the future.

Determining the stability of vitamin D in stored Guthrie dried blood spot samples: retrospective cross-sectional study

Sarah Adedara¹, Fabrizio Messina², Professor Amaka Offiah³

1. University of Sheffield Medical School, Sheffield, UK
2. School of Health and Related Research, University of Sheffield, Sheffield, UK
3. Professor Amaka Offiah, Radiology Department, Sheffield Children's NHS Foundation Trust, Sheffield, UK

Background: The diagnosis of inflicted injury in a pre-ambulant infant is one of exclusion, with no features being perfectly diagnostic of the condition. An important differential diagnosis to consider is rickets, this can increase an infant's likelihood of developing fractures due to poor bone mineralisation. Healthy bone mineralisation is dependent on vitamin D (25OHD) mediated phosphate and calcium absorption. 25OHD concentrations measured from Guthrie cards of new-borns heel prick tests have been used to later determine the bone health in infants presenting with unexplained fractures. This study aims to determine the stability of 25OHD concentrations measured from Guthrie blood samples over a sequential period of time; to ascertain whether 25OHD measured shortly after birth can be used to assess the bone health of an infant several months later.

Method: The 25OHD concentrations of 720 dried blood spot samples obtained from a new-born heel prick test, in the South Yorkshire and East Midlands area, was measured using liquid chromatography tandem mass spectrometry. The samples were split into nine groups with varying storage duration times ranging from 3 weeks to 8 years. Levels measured at 3 weeks served as baseline and were compared to samples with a storage duration of 1, 3, 6, 9 and 12 months and 2, 3, 5 and 8 years.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





Results: From baseline the median 25OHD concentrations decreased by 20% ($p < 0.04$), 21% ($p < 0.001$), and 45% ($p < 0.001$) after 3, 5 and 8 years of storage respectively. Levels measured after 3 and 6 months of storage were 38% ($p < 0.001$) and 62% ($p < 0.001$) greater than baseline whilst levels measured after 1 and 12 months and 2 years were not significantly ($p > 0.05$) different from baseline.

Conclusion: The results are suggestive of a decline in 25OHD 3 years post storage, potentially occurring secondary to degradation due to molecular instability, poor blood sampling methods and potential sunlight exposure in acquisition and transportation of samples. Additionally, the seasonal variability of 25OHD could account for the increase in its concentration recorded after 3 and 6 months of storage. These samples were collected in early autumn and summer, whilst the remaining samples were obtained in winter.

PIK3CA-related overgrowth syndrome' s (PROS) spectrum of imaging findings

Spyridon Prountzos¹, Nikolaos Papagiannis¹, Melanthi Tsikna¹, Sofoklis Antonakis¹, Maria Spanou², Argyro Mazioti¹, Efthymia Alexopoulou¹

1. 2nd Department of Radiology, National and Kapodistrian University of Athens, University General Hospital "Attikon"

2. Pediatric Neurology Unit, 3rd Department of Pediatrics, National and Kapodistrian University of Athens, University General Hospital "Attikon"

Learning objective:

- To familiarize the pediatric radiologist with a not-so-rare pediatric entity
- To present state-of-the-art imaging techniques for different forms of the PROS spectrum
- To review their radiological imaging features

Methods or Background: PIK3CA-related overgrowth spectrum (PROS) encompasses various overlapping phenotypes with varying severity. The core features are the congenital or early childhood onset of segmental/ focal overgrowth. Tissue overgrowth may include the fibrous, nervous, vascular, lymphatic, skeletal, or lipomatous origin. PROS disorders are driven by somatic, gain-of-function mutations in the PIK3CA gene, which encodes a subunit of the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

enzyme phosphoinositide 3-kinase (PI3K). The PI3K enzyme regulates cell growth and survival. The mutations responsible for PROS lead to hyperactivity of the PI3K gene, accelerating cell growth and division.

Findings: We retrospectively reviewed the radiologic findings of pediatric patients that were genetically diagnosed with PROS and treated in our hospital. Our PROS spectrum included four patients with unilateral hypertrophy of fibro adipose tissue of the lower limb and two patients with half-body hypertrophy. Primary lymphatic and combined vascular malformations were present in five patients. Skeletal abnormalities were found in three patients. One was diagnosed with multiple lipomatosis. Imaging investigation included ultrasonography, Magnetic Resonance Imaging (MRI), and conventional radiography.

Conclusion: Patients with the PROS spectrum may include any combination of primary germ layers' overgrowth, thus leading to various imaging features depending on the germ layer involved. Radiological imaging of PROS patients is essential not only in the diagnosis (even in the perinatal period) but also in the follow-up after treatment.

Increasing Iron Supplementation in Breastfeeding Infants at the 4-month Health Maintenance Visit

Sukaina Afzal Furniturewala¹, Oneilia Brooks¹, Tony Abdel-Missih¹, Ayman Ibrahim¹, Smrithi Krishnamohan¹, Washington Marin-Castro¹, Penelope Martinez¹, Gabriela Rodas¹, Deepak Vijayan¹, Gregory Kenny¹, Amy Woolever¹, Jennifer Pintiliano¹

1. Pediatrics, New York City Health + Hospitals Elmhurst, General Pediatrics, Icahn School of Medicine at Mount Sinai

Introduction: Iron stores that are accreted in infants are eventually exhausted around 4-6 months of age. The content of iron in breastmilk remains low which warrants the need for iron supplementation in breastfed infants. The American Academy of Pediatrics (AAP)

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



recommends that all exclusively or partially breast-fed infants receive iron supplementation of 1 mg/kg per day until complementary iron rich foods are introduced into their diet.[1]

Aims/Objectives: Aim: To increase transition from non-iron containing to iron containing vitamin supplementation in infants receiving any breastmilk by 30% from baseline over a period of four months.

Methods: We conducted a quality improvement project using 3 PDSA cycles. We reviewed charts of all infants who presented to the Pediatric Primary Care Clinic at their 4 months visit pre and post intervention to capture data for correct transition from non-iron containing to iron containing vitamin supplements. Exclusively formula fed infants were excluded from this study. We performed 3 PDSA cycles consisting of the following: 1. Education on transitioning to iron containing vitamins 2. Email reminders for reinforcement. 3. Introduction of a hard stop phrase in EMR for all 4 months well child visit encounters.

Results: At baseline the iron containing vitamin supplements prescription was at 55.2%. After PDSA cycle 1 overall prescription rates increased to 72.2% however in the fourth week there was a decrease to 54.5% due to provider non-adherence. After PDSA cycle 2 prescription rates increased to 79.3% and after PDSA cycle 3 prescription rates increased to 89.8%.

Conclusion: Education, email and EMR format changes that incorporated transitioning to iron containing vitamin supplements as part of anticipatory guidance helped improve effective transitioning to iron containing vitamin supplements.

Screening for elevated PHQ-9 scores in an Adolescent Clinic before and after COVID-19 lockdown measures

Sukaina Afzal Furniturewala, MD¹, Adila Chamavaliyathil, MD¹, Thaina Rousseau-Pierre, MD¹

1. Icahn School of Medicine at Mount Sinai

Background: In the United States, little is known on the effects of COVID-19 and its changes on mental health in adolescents, pre and post the lock-down measures. According to biannual Youth Risk Behavior Survey 2023, 57% of teen girls reported persistent sad or hopeless feelings in 2021, almost double the rate of boys and the highest levels reported this decade [1]

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Objective: To ascertain more precise estimates of the elevated PHQ-9 scores in adolescents during COVID-19 and to compare these with pre-pandemic estimates.

Methods: Data on all patients seen in the Adolescent Clinic aged 12 to 22 that had a PHQ9 completed during both time periods of January 2019 to February 2020 (Pre-lockdown) and March 2020 to December 2021 (Post lockdown) was obtained using an report dashboard in our EMR. SPSS 25 software was used to calculate the PHQ9 means, % of PHQ9 greater or equal to 10. Mean PHQ9 scores in the two groups were obtained using paired sample t-tests. Chi-Square Test of Independence to determine an association between categorical variables and the outcome variable of positive PHQ-9. A logistic regression model was also used to determine factors associated with positive PHQ9 scores

Results: 790 adolescents were seen during both time periods. PHQ scores (greater or equal to 5) increased from 8.8 % to 14.2 from pre-lock down period to post-lockdown period($p < 0.001$). Among those with a PHQ9 score greater than 5 during both time periods, there were an average difference between pre and post lock down PHQ-9 score ($t_{102} = 2.386$, $p = 0.019$). In a logistic regression model, none of the predictor variables were associated with changes in PH9 scores during both time periods.

Conclusions: COVID-19 has been found to be associated with mental health changes in adolescents emphasizing the importance of a holistic approach that focuses on mental health when managing COVID-19

References:

Youth risk behavior survey: Data summary and trends report.

https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf. Published Feb. 13, 2023.

Neonatal Sepsis Before and During the Covid-19 Pandemic

Utsav Timalina, MD¹, Kristina Ericksen, MD¹; Abhinav Thakral¹, MD; Kusum Viswanathan, MD¹; Arnikka Rubia, MD¹; Anushree Murugan¹, MD; Prasansa Basnet, MBBS¹; Bhawana Chhetri, MBBS¹; Fernanda Kupferman, MD¹

1. Department of Pediatrics, One Brooklyn Health, Brookdale Hospital Medical Center, Brooklyn, New York

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Neonatal sepsis is a major cause of morbidity and mortality among neonates. During the Covid 19 pandemic, preventive measures, shift of work force and medical supplies were adopted hospital wide to respond to the health crises. These measures might have impacted the incidence of neonatal sepsis, early onset sepsis (EOS), or late onset sepsis (LOS). The objective of this study is to assess if there was a difference in the incidence of neonatal sepsis before and during the Covid-19 pandemic.

Materials and Methods: A retrospective study was conducted to compare the incidence of neonatal sepsis before (March 2018- Feb 2020) and during the Covid-19 pandemic (March 2020-Feb 2021). Babies were diagnosed with neonatal sepsis if the microorganism was isolated from blood culture, urine culture or CSF culture OR if they received the antibiotics for suspected sepsis for at least five days and either had the WBC $<4 \times 10^9$ cells/L, CRP >1.5 mg/dL or immature to total neutrophil ratio (IT) >0.2 if no microorganism was isolated from the culture. The data were manually abstracted from the hospital's electronic medical records that included all live born neonates in our institution at Brooklyn, NY, from March 2018 to Feb 2021. The difference in the incidence of neonatal sepsis before and during the pandemic were analyzed using Chi-squared test.

Results: A total of 2402 neonates were born between March 2018 and February 2021 (1686 before and 716 during the pandemic). Of them, 235 babies (10%) were diagnosed with neonatal sepsis; 153 (9%) before and 82 (11.5 %) during the pandemic. Maternal characteristics of the population are described in table 1. Despite the reduction in two known risk factors such as maternal chorioamnionitis ($p= <0.001$) and asymptomatic bacteriuria ($p=0.014$) during the Covid-19 pandemic, there was no significant difference in the incidence of neonatal sepsis, EOS, and LOS (See table2).

Conclusion: Our study results indicate that the preventive measures adopted from the neonatal and maternal unit during the pandemic might not have impacted the incidence of neonatal sepsis, EOS, and LOS during the pandemic.

Tubes and lines in neonates. A guide for residences.

Giatskos Vasileios¹, Mouroukis Apostolos¹, Emmanouela Tsouvala², Vasiliki Varlami², Aggelopoulou Panagiota¹, Savvas Defteraios³

1. Radiology Resident, General University Hospital of Alexandroupolis

2. Consultant, NICU, General University Hospital of Alexandroupolis

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

3. Professor of Radiology, General University Hospital of Alexandroupolis

Purpose: Tubes and lines used in Neonatal Intensive Care Unit are every day practice. The aim of our study is to illustrate the common sites and positions of these lines and tubes and to point out the need of knowledge about correct and proper location, position and anatomical course of various catheters (tubes and lines). Furthermore, residence must be familiar with the complications that can be provoked.

Materials and methods: The “babygrams” (chest-abdomen x-rays), ultrasound exams, fluoroscopy images and Computed Tomography scans from our department between 2012 and 2022 were retrospectively reviewed. The appropriate depiction of “tubes and lines” and the appropriate (or not) positioning of various tubes and lines were recorded.

Results: More frequent imaging depicted catheters are Feeding Tube (FT), Endotracheal Tube (ETT), Umbilical Vein Catheter (UVC) and Umbilical Artery Catheter (UAC). Also, quite often we have to deal with Central Venous Lines (CVL), Peripherally Inserted Central Catheters (PICC) and Chest or Peritoneal Tubes (e.g. for pneumothorax or postsurgical). The presence of complications is infrequent but all of these were noted. The most common complication from malpositioned catheters (except thrombus formation along the catheter) was hepatic hematoma from perforation of an intrahepatic vascular wall.

Conclusions: Imaging techniques provide usually accurate information about “tubes and lines” and their proper or not positioning. The knowledge of their expected anatomical course is crucial to reveal a tube or a line in malposition. Thus, we can prevent neonates from complications or structural injuries which may result in adverse consequences or even in prolonged duration of NICU hospitalisation.

Musculoskeletal

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Pictorial review of Legg-Calve-Perthes disease and the role of a reporting radiologist in diagnosis and management outcome

Alexander Pearce¹, Richard Jenkins¹, Aung Oo¹

1. Southampton General Hospital

Purpose/Objective/Background: Legg-Calve-Perthes disease (LCPD) is a disease of the paediatric population characterised by the necrosis of the femoral head epiphysis during growth. The condition affects between 5-15/100000 children less than 15 years of age, peaking in its incidence between 4 and 8 years. Its aetiology and treatment remain a contentious debate despite being studied for more than 100 years. ¹ Fortunately, classification by reporting radiologists has aided the appropriate management of such cases, whether this is conservative or surgical in its management.

The objective of this educational poster is to provide a pictorial review of the current literature and, ultimately, improve the confidence of radiology trainees in the accurate radiological detection and classification of LCPD.

Methods & Materials: Review of academic literature within the last decade and consolidating the important radiological findings within a poster format for the education of radiology trainees and reporting clinicians of all abilities. This will include PubMed resources detailing the aetiology, radiological findings, classification and management of paediatric LCPD cases.

Results: The available evidence detailing the aetiology and management of LCPD provides a diverse understanding of the condition, with current literature leaning towards LCPD being a mechanically induced ischaemia that progresses to femoral head avascular necrosis. Three classification systems: Catterall, Salter-Thompson and Herring, are used by reporting clinicians to assist the surgeons with prognosis, such as the percentage of femoral head involvement or degree of deformity ². However, management is dependent on numerous individual factors and remains a topic of ongoing debate within surgical centres.

Conclusions: LCPD is a complex condition with varied radiological presentations leading to the need for ongoing educational reviews for trainees and senior radiologists alike. Radiology remains the pillar of diagnostic and prognostic information for the clinician, where the early detection of LCPD by the radiologist can significantly improve the morbidity of affected children. Therefore, this pictorial review LCPD will provide an invaluable resource to radiology trainees and reporting clinicians.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****References:**

- ¹ Dillman J & Hernandez R. MRI of Legg-Calve-Perthes Disease. *AJR Am J Roentgenol.* 2009;193(5):1394-407.
- 2 Pavone V, Chisari E, Vescio A, Lizzio C, Sessa G, Testa G. Aetiology of Legg-Calvé-Perthes Disease: A Systematic Review. *World J Orthop.* 2019;10(3):145-65.

A trainee's guide to imaging of Juvenile Idiopathic ArthritisAung Oo¹, Richard Jenkins¹, Maryam Adil¹, Alexander Pearce¹

1. University Hospital Southampton

Purpose: Juvenile idiopathic arthritis (JIA) is an autoimmune chronic arthritic disease of childhood with many different subtypes. Early diagnosis and management are essential, as, without intervention, it can lead to debilitating complications such as limb-length discrepancy and joint deformity. While diagnosing JIA requires clinical evaluation and blood tests, imaging plays an essential role in detecting early inflammation before joint damage.

The aim of this presentation is for junior radiology trainees to get familiar with the imaging characteristics of JIA on different modalities and the role of the radiologist in JIA.

Methods and materials: A pictorial review is done to demonstrate imaging features of JIA involving different joints on US, MRI and radiographs. We will cover acute changes such as synovitis, joint effusion, bone oedema, and periarticular inflammation. Chronic changes such as bone erosion, rice bodies, ankylosis etc., will also be included.

Results: By highlighting the imaging features of JIA, we hope junior radiology trainees learn about the pros and cons of different imaging modalities and how to identify the typical imaging features of the diagnosis.

Conclusion: Knowledge of the disease spectrum and familiarisation with appropriate imaging modalities and imaging characteristics are paramount in image interpretation and early disease detection. We hope to leave trainees feeling confident to tackle JIA cases in their practice.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Hand Bone Dysplasia: A Radiographic Approach to Evaluation

Ercan Ayaz¹, Akçahan Akalın²

1. Department of Radiology, Diyarbakır Children's Hospital, Diyarbakır/Turkey
2. Department of Pediatric Genetics, Diyarbakır Children's Hospital, Diyarbakır/Turkey

Background

Disorders of bone are common findings not only in the genetic disorders but also in the endocrine and metabolic diseases. Dysplasia of hand can be seen as an isolated abnormality but frequently accompanies other disorders. In this presentation, we would like to describe characteristic findings of some groups of genetic, endocrine, and metabolic diseases that we have encountered in our hospital located in a region where consanguineous marriages and genetic disorders are quite common.

Methods: We evaluated our archive of pediatric genetics and metabolism departments and retrieved the hand radiographs of patients with genetically or clinically confirmed diagnosis of bone dysplasia/disorders.

Results:

1. **Brachydactyly:** It is the most frequent abnormality of hands. It can be seen partial or complete; an isolated finding or as part of a skeletal dysplasia or syndrome.
 - a. **Metacarpal shortening more prominent:** TRPV4-related disorders
 - b. **Phalangeal shortening more prominent:** Achondroplasia and related FGFR3 conditions,
 - c. **Short hand instead of short digits (carpal hypoplasia more prominent):** Hajdu-Cheney syndrome, microcephalic osteodysplastic primordial dwarfism (MOPD) type 2
2. **Polydactyly:** It is defined as an extra digit on the hand or foot. It can be attached to the adjacent digit (polysyndactyly), or can be well-formed with an articulated extra metacarpal. It is frequently seen in ciliopathies, Bardet Biedl syndrome, Ellis-van Creveld syndrome, trisomy 13.
3. **Oligodactyly:** It can be seen as a deficient digit or when the digits fail to separate during embryonic development. It can be seen in radial ray anomalies, Moebius syndrome, T-box family of transcription factor defects, oro-facial-digital syndrome type 10.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



4. **Epiphyseal/diaphyseal dysplasia:** Mucopolysaccharidoses, Schimke immunosseous dysplasia, spondyloepiphyseal dysplasia (SED) congenital, 3M syndrome
5. **Osteosclerotic disorders:** Osteopetrosis, pyknodysostosis
6. **Limb reduction defects (Split hand/ foot):** Absence of central digits, with or without absence of central metacarpal/ metatarsal bones, usually seen in ectrodactyly syndromes.
7. **Non-syndromic metacarpal/phalangeal abnormalities**

Conclusions: While evaluating hand dysplasia, pattern-based approach is helpful to narrow the diagnostic tests for responsible genetic/endocrine conditions. Number of phalanges, length, and thickness of the metacarpals and phalanges according to age, bone densities, epiphyses according to age are the main features that need to be evaluated.

Does Bone Health Index values Correlate with High-Resolution Peripheral Quantitative Computed Tomography parameters in healthy Children?

Heba saleh Shalo^{1,3}, Alan Rigby², Paul Dimitri^{1,4}, Amaka C. Offiah^{1,5}

1. Academic Unit of Child Health, Department of Oncology and Metabolism, University of Sheffield, Damer Street Building, Western Bank, Sheffield S10 2TH, United Kingdom
2. Institute of Clinical and Applied Health Research, Hull York Medical School, Hull, UK
3. Faculty of Medicine, Omar Al-Mukhtar University, Bayda, Libya
4. Department of Pediatric Endocrinology, Sheffield Children's NHS
5. Foundation Trust, Western Bank, Sheffield, United Kingdom
6. Radiology Department, Sheffield Children's NHS Foundation Trust, Western Bank, Sheffield, United Kingdom

Background: Bone densitometry plays a significant role in identifying children with low bone mineral density (BMD). Dual-energy X-ray absorptiometry (DXA) is currently the reference standard for evaluating BMD in children and adults. High-resolution peripheral quantitative computed tomography (HR-pQCT) and digital x-ray radiogrammetry (DXR) have been developed to measure bone mineral density and assess bone strength. Although HR-pQCT is not size dependent and can provide information about bone microarchitecture, it is costly and

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



not widely available. Compared to DXA and HR-pQCT, DXR is easily used in children and widely available. DXR measures bone health index (BHI) and bone health index standard deviation score (BHI SDS) from wrist radiographs by using BoneXpert software.

Aim: Assess the degree of correlation between BHI and BHI SDS values and HR-pQCT parameters [including finite element analysis (FEA)] in male and female healthy children.

Methods: This study is a prospective observational cohort that recruited 20 healthy participants (10 males and 10 females) aged between 8 and 14 years. Each child underwent a wrist radiograph, along with an ipsilateral distal radial HR-pQCT scan on the same day. Pearson's correlation coefficient to calculate the degree of correlation between BHI values and HR-pQCT parameters was performed.

Results: The mean age for participants was 11 years. The mean BHI was 4.693, while BHI SDS was 0.056. There was a significant difference between males and females in BHI SDS ($p > 0.001$), but no difference in BHI ($p < 0.001$). The mean for HRpQCT parameters were (total density was $245.5\text{mg}/\text{cm}^3$, cortical density was $642.7\text{mg}/\text{cm}^3$, trabecular density was $166\text{mg}/\text{cm}^3$, trabecular thickness was 0.06mm , trabecular separation was 0.39mm , cortical thickness was 0.35mm and cortical porosity was 0.0455%). BHI-SDS showed a strong correlation with total density and trabecular density parameters ($r=0.62$ and $r=0.60$ respectively) and a weak correlation with cortical density ($r=0.3$).

Conclusion: Although the BHI SDS is dependent mainly on cortical structure, a strong correlation was found between the BHI SDS and trabecular parameters. So, BHI SDS may reflect the cortical and trabecular bone density in healthy children. We have another cohort of osteogenesis imperfecta patients whose results will be compared to those of healthy children.

Obturator Abscess in Children - A Mimicker of More Common Pathology

Dr Jelena Grgur¹, Dr Dragana Simić¹, Doc. dr Vukadin Milankov¹

1. Institute for Children and Adolescents Health Care of Vojvodina Hajduk Veljkova 10, Novi Sad, Serbia

Background: Obturator abscess is a rare condition in children, which may be categorized as primary and secondary, most commonly affecting the muscles around the hip, including the

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

iliopsoas, piriformis, obturators, adductors, and gluteal muscles. The diagnosis of obturator abscess is often prolonged due to low incidence of the disease and nonspecific signs and symptoms. The obturator abscess is often misdiagnosed as it mimics more common pathologies like septic arthritis of the hip, transient synovitis of the hip, acute retrocaecal appendicitis or perforated appendix, osteomyelitis or a psoas abscess. Timely diagnosis of obturator abscess is imperative in order to prevent the development of systemic complications.

Materials and methods: A 7-year-old boy was admitted to the Department of Abdominal Surgery of a regional hospital. The physical examination revealed abdominal pain, pain in the right hip, limited movements of the right upper leg, and fever. Laboratory tests showed increased inflammatory factors. Ultrasound, as well as computerized tomography (CT) and magnetic resonance imaging (MRI) examinations were performed.

Results: At admission to the hospital, an ultrasound examination of the abdomen and hips were performed, and showed normal findings. A repeated ultrasound of the abdomen and hips verified a small synovial effusion within the right hip. On the fourth day of hospitalization, a CT of the abdomen and pelvis was performed, where an abscess collection was recorded along the lower branch of the pubic bone with the largest diameter being 30mm. Subsequently, pelvis MRI was performed, which detected an abscess collection within the right external obturator muscle with inflammation of the surrounding soft tissue. In the further treatment, antibiotic therapy was prescribed (Clindamycin, Garamycin, Maxicef), followed by a gradual improvement in the child's general condition and local results.

Conclusion: Although there are more common pathological entities with symptomatology within the right lower abdominal quadrant and right hip, an obturator muscle abscess can be found in children, with a need of prompt final diagnosis and treatment. Prolonged symptoms, not cleared up with ultrasonography have to be further inspected with more sophisticated diagnostic modalities.

Location-based differential diagnosis for benign lumps and bumps on ultrasound

Andrew Bain¹, Joy Barber¹

1. Department of Radiology, St George's Hospital, London

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Purpose: To review common soft tissue lumps and bumps referred from the community for ultrasound assessment.

Methods: Using a body-map approach, we present a location-based and pattern-recognition approach to differential diagnosis for soft tissue abnormalities on ultrasound.

Materials: Ultrasound referrals for a ‘lump’ from community and general paediatrics were reviewed; scans detecting lymph nodes only as the cause were excluded from the imaging pool.

Results: Ultrasound imaging of lumps and bumps from the top of the head to the tips of the toes are presented, including dermoids, scalp haematomas, ectopic thymus, carotid body tumours, ranulas, thyroglossal duct cysts and branchial cleft malformations, atypical TB, pilomatricomas, injection site granulomas, ganglion cysts amongst others.

Conclusions: Sometimes on imaging the location is key; this body-map approach to distinctive ultrasound lumps and bumps should help in getting the diagnosis!

Reliability Assessment of the OMERACT Whole-Body Magnetic Resonance Imaging Scoring System for Juvenile Idiopathic Arthritis

Jyoti Panwar¹, Mirkamal Tolend², Eva Kirkhus³, Arthur B Meyers⁴, Bernadette Redd⁵, Iwona Sudol-Szopinska⁶, Nisha Varma⁷, Emilio J Inarejos Clemente⁸, Robert A Colbert⁹, Jonathan Akikusa¹⁰, Simone Appenzeller¹¹, John A Carrino¹², Nele Herregods¹³, Kerri Highmore¹⁴, Lennart Jans¹³, Jacob L Jaremko¹⁵, Thekla von Kalle¹⁶, Marion A van Rossum¹⁷, Dax G Rumsey¹⁸, Hemalatha Srinivasalu^{9,19}, Jennifer Stimec², Shirley M Tse²⁰, Marinka Twilt²¹, Nikolay Tzaribachev²², Andrea S Doria²

1. Lumus Imaging, Brisbane, Queensland, Australia.
2. Department of Diagnostic Imaging, Research Institute, The Hospital for Sick Children, and Department of Medical Imaging, University of Toronto, Toronto, ON, Canada.
3. Department of Radiology, Oslo University Hospital, Oslo, Norway.
4. Department of Radiology, Cincinnati Children's Hospital, Cincinnati, OH, United States.
5. Department of Radiology, Clinical Center, NIH, Bethesda, Maryland, United States.
6. National Institute of Geriatrics, Rheumatology and Rehabilitation, Warsaw, Poland.
7. Department of Medical Imaging, The Royal Children's Hospital, Melbourne, Australia.
8. Department of Radiology, Hospital Sant Joan de Deu, Barcelona, Spain.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



9. Pediatric Translational Research Branch, Musculoskeletal and Skin Diseases, National Institute of Arthritis, NIH, Bethesda, MD, United States.
10. Rheumatology Service, Department of General Medicine, Royal Children's Hospital Melbourne, Australia.
11. Department of Orthopedics, Rheumatology and Traumatology, School of Medical Science, University of Campinas, Campinas, Brazil.
12. Department of Radiology, Hospital for Special Surgery, New York, United States.
13. Department of Radiology, Ghent University, Ghent, Belgium.
14. Department of Radiology, Children's Hospital of Eastern Ontario, Ottawa, ON, Canada.
15. Department of Radiology & Diagnostic Imaging, Stollery Children's Hospital, University of Alberta, Edmonton, Alberta, Canada.
16. Radiologisches Institut, Olga Hospital Klinikum, Stuttgart, Germany.
17. Amsterdam Rheumatology and Immunology Center, Reade, and Emma Children's Hospital Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands.
18. Division of Rheumatology, Department of Pediatrics, University of Alberta, Edmonton, Alberta, Canada.
19. Division of Rheumatology, Children's National Hospital and George Washington University School of Medicine, Washington, DC, United States.
20. Division of Rheumatology, The Hospital for Sick Children, Toronto, ON, Canada.
21. Department of Pediatrics, Division of Rheumatology, Alberta Children's Hospital, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada.
22. Image Analysis Group, Bad Bramstedt, Germany.

Background and Objective: Inflammation in joints and entheses is a common feature in juvenile idiopathic arthritis (JIA). It can be difficult to objectively quantify clinically or on imaging. In this study, we tested the inter-reader reliability of a newly developed whole body magnetic resonance imaging scoring system for JIA (JAMRIS-WBMRI).

Materials and Methods: Sixteen whole-body MRI and one pelvic MRI from children with JIA were scored independently by five radiologists using the JAMRIS-WBMRI scoring system administered through an online survey platform (REDCap) with integrated atlas and following a calibration tutorial. The scoring system contained 729 item-region combinations, including, 1) in peripheral joints (from sterno-clavicular to the distal interphalangeal joints): bone marrow

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



edema (BME), effusion/synovial thickening (combined item), and pericapsular soft tissue edema; 2) in sacroiliac joints: BME and effusion/synovial thickening/capsulitis; 3) in spine [craniovertebral junction joints, facet joints from C2-C3 to L5-S1 and disco-vertebral units (DVUs) from C2-C3 to L5-S1]: BME and/or effusion/synovial thickening in craniovertebral junction and facet joints, BME in DVUs; 4) in entheses (22 attachments): BME, perientheseal soft tissue edema and tendon/ligament high signal; and 5) chronic nonbacterial osteomyelitis (CNO)-like lesions in 21 bone regions. The inter-reader reliability was assessed by Gwet's AC1 coefficient on the subset of items with at least 10% prevalence in sample.

Results: A total of 442 items in the JAMRIS-WBMRI received a non-zero grade in at least one reading. Within this scored subset of items, 117 items received a non-zero grade in >10% of the readings, of which 85 related to findings in the joints, 25 to the entheses, and 7 to CNO-like lesions. Interquartile ranges of the five-reader AC1 reliability coefficients were 0.67-0.79 (range: 0.51-0.91) for the joints, 0.71-0.86 (range: 0.48-0.97) for the entheses, and 0.73-0.85 (range:0.72-0.85)

The role of MRI in the assessment of bone material properties and strength: a systematic review

Nayef Alasmari^{1,2}, Dr Xinshan Li^{3,4}, Professor Amaka C Offiah^{1,5}

1. Department of Oncology and Metabolism, The University of Sheffield, Sheffield, UK.
2. Majmaah University, Saudi Arabia.
3. INSIGNEO Institute for in silico Medicine, The University of Sheffield, UK.
4. Department of Mechanical Engineering, The University of Sheffield, UK.
5. Sheffield Children's NHS Foundation Trust, Sheffield, UK

Objectives: (1) To evaluate the role of MRI in assessing bone size/shape, material properties, and strength; and (2) to investigate whether MRI-based finite element analysis (FEA) is an accurate diagnostic tool for assessing bone density, material properties, and strength when compared to other medical imaging modalities.

Methods: The Web of Science, Medline, and Cochrane databases were searched from January 1980 to 1 July 2021. The systematic review was carried out according to the PRISMA checklist

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

and the critical appraisal skills program (CASP) quality assessment tool was independently used by three reviewers to assess the quality of eligible papers. A narrative synthesis of the eligible studies was then conducted.

Results: Of the 1,219 identified studies, 28 (27 in adults) were eligible for this review. These included a total of 733 patients, aged from 4 months to 99 years. MRI showed a high degree of reliability and reproducibility for assessing bone material properties and strength. In addition, MRI could help in detecting bone-related diseases and monitoring treatment progress. MRI-based finite element analysis was shown to predict fracture risk. In general, the included papers were of high quality.

Conclusion: MRI and FEA can estimate the material properties and strength of bone in adults. Only one study included children, which should be a focus for future research.

Keywords: Systematic Review; MRI; Finite element analysis; Bone mechanics; Bone density.

DISTRIBUTION OF IMMUNOLOGY FINDINGS AMONG PEDIATRIC PATIENTS EXAMINED BY MR UNDER SUSPICION OF SACROILIITIS

Nikola Eić¹, Petković M.¹, Koprivšek K.¹, Bogdanović B.¹, Balj Barbir S.¹, Đuretić A.¹, Milanović B.¹, Vijatov Đurić G.¹,

1. Institute for Child and Youth Health Care of Vojvodina

Objective: To assess the distribution of serology positive patients among pediatric patients who underwent magnetic resonance (MR) exam of sacroiliac joints (SIJ) due to suspected sacroiliitis.

Material and methods: Retrospective study for the period of three years included 34 patients, 12 girls (35.3%) and 22 boys (64.7%), who underwent MR exam of SIJ in our MRI unit. Median age of patients was 12.5 (min 3; max 17.5; SD 4.12). MR exams were performed by Siemens Magnetom Aera 1.5 T, using standard protocol for SIJ. Serology and immunological data for all patients were collected from the hospital information system.

Results: MR signs of sacroiliitis were detected in 17 patients (50%); 9 (26.5%) of them had mild, 6 (17.6%) moderate and 2 (5.9%) severe MR changes. Gadolinium based contrast agent was applied in 17 patients (50%), contrast enhancement (CE) was registered in 10 cases (29.4%). Of all 34 patients, 10 (29.4%) were HLA B27 positive, 3 (8.8%) were positive on other HLA antigens (HLA B13, 35, 51, DQ), 1 (2.9%) was positive in each group of the following

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**





serology/immunology tests: Coxsackie and Adenovirus IgM, Lupus anticoagulans (LA), anticyclic citrullinated peptide (antiCCP) and Antithyroglobulin antibody (antiTG). HLA B27 positive patients had SIJ MR changes in 7 cases (10%) (3 mild, 4 moderate), 3 (30%) had no MR detectable changes; in this group in 5 (50%) cases CE was present. 3 (100%) of other HLA antigenes positive patients had SIJ MR changes (1 severe, 2 mild), two of them with CE. Each patient positive on LA, antiCCP and antiTG had SIJ MR changes with CE (LA positive patient had severe, following two mild MR changes).

Conclusion: Severe SIJ MR changes were observed in patients who were LA or HLA B13, 35, 51, DQ positive, while in the group of HLA B27 positive ones MR changes were absent, mild or moderate. Further investigation and a larger number of patients is necessary for getting statistically significant and more reliable results.

The use of musculoskeletal ultrasound in children with fracture suspicion

Roxana Iacob¹, Emil Robert Stoicescu¹, Diana Manolescu¹, Simona Cerbu¹, Emil Radu Iacob¹
 1. Department of Radiology and Medical Imaging, The 'Victor Babes' University of Medicine and Pharmacy Timisoara Department of Pediatric Surgery

Background: Fractures are among the most common medical-surgical emergencies in people of all ages, and they play an important role in pediatric orthopedic pathologies because children are more active than adults. According to studies, boys are more likely than girls to present at the emergency room accusing long bone fractures. Musculoskeletal ultrasonography has been shown to be effective in detecting fractures and can be used as a complementary method to radiographic or CT examinations due to its non-irradiant nature.

Methods and materials: Children aged 1.5 to 19 years old with fracture suspicion but a negative/normal X-ray or patients with a lower suspicion of fracture were evaluated using ultrasound to disprove or confirm the presence of a cortical bone discontinuity. The study enlisted the participation of 42 pediatric patients.




**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Results: Seven of the patients examined had a history of chest trauma, but X-rays did not confirm the diagnosis. Ultrasound was instrumental in the diagnosis of rib fractures, as well as in tracking the process of consolidation and callus formation.

Other interesting cases included a professional dancer and a tennis player who experienced pain in their lower limbs. Both patients were suspected of having tendinopathy. Surprisingly, the musculoskeletal ultrasound revealed a stress fracture in the right metatarsus II and a stress fracture in the right 4th metatarsus.

One patient was discovered to have a unicortical femoral fracture, also known as a "green stick" fracture.

On the other hand, for complicated bone injuries and non-linear fractures, ultrasound did not prove to be as sensitive as an X-ray.

Conclusion: Musculoskeletal ultrasonography can help support and diagnose long bone fractures, especially when clinical suspicion is high and the X-ray hasn't revealed a clear cause or diagnostic. Because it is not irradiating, it is also a sensitive method for detecting early callus formation and can be a repetitive imaging method.

Anterior knee pain in children and adolescents; review of common and uncommon etiologies and their imaging characteristics.

Charlotte Gallienne¹, Kelly Ainsworth¹, John Donnellan¹, Secil Eksioglu¹, Heba Takroui¹, Yongdong Wang¹, Samuel Stafrace¹

1. McMaster University, McMaster Children's Hospital, Hamilton, Ontario, Canada

Purpose: To review the multi-modality imaging characteristics of causes of anterior knee pain in children and adolescents.

Background: Anterior knee pain is a common clinical scenario for which children and young adults are referred for imaging. Causes (and reciprocal imaging) findings are different to the adult population with a significant number of etiologies being specific or more common in the immature skeleton.

Methods and materials: Retrospective review of cases referred for imaging for anterior knee pain over the last 2 years was performed.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Results: The imaging characteristics of typical and atypical causes of anterior knee pain are presented taking an ‘outside in’ anatomical approach. These include cases with pain related to subcutaneous tissues (ex: bursae, abscesses), the extensor mechanism (ex: tibial apophysitis, patellar tendinitis), the anterior knee joint compartment (ex: chondromalacia patellae, OCD, patellar subluxation/dislocation, infection, inflammation), the intra articular extra synovial fat (ex: anterior impingement), non-anatomical specific conditions that can present with anterior pain (ex: regional non aggressive and aggressive lesions, hematological conditions), atypical pathologies (ex: regional vascular lesions) and causes of referred pain (ex: hip conditions such as SCFE).

Conclusion: Causes of anterior knee pain in children and adolescents are common and multiple. This presentation reviews this spectrum of conditions and outlines their radiological manifestations assisting the reporting radiologist exclude these pathologies in a systematic manner.

Frequency and Patterns of Motion Artifact in Pediatric EOS Spinal Imaging

Sean Schoeman MBChB¹, Shyam Venkatakrishna, MBBS¹; Savvas Andronikou, MBBCh, PhD¹

1. Children's Hospital of Philadelphia

Introduction: Stereoradiography imaging (SRI) reduces radiation exposure in children requiring serial imaging studies for chronic conditions such as scoliosis (1). SRI (EOS system) is preferential conventional radiographs for this reason. The technology uses a digital slot-scanning in which different types of artifact have been documented: edge-enhancement, movement, and incorrect-centering artifact (2)(3).

Methods and Materials: Retrospective review of EOS spinal images was conducted. Imaging features were captured, and artifact was identified. When present, artifact was analyzed to

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



determine if it mimicked hardware distortion, worsened an apparent scoliosis or altered other anatomy. This was confirmed through analysis of prior / follow-up studies by an attending pediatric radiologist.

As the project progressed apparent horizontal plane distortion, was compared by measuring Cobb angle, width of the pelvis (iliac crest to iliac crest), and transverse thoracic diameter. We determined if the widening caused worsening of scoliosis.

Results: 81 EOS studies were evaluated (54 females; 67%)(median age 12.8 years [IQR: 10.6 - 14.5]). The whole spine was included in all but one case where the sacrum was cut off. Vertebral body visualization was good in 20 (24.7%), moderate in 44 (54.3%) and poor in 17 (21%). Scoliosis was noted in 76 cases [93.8%].

10/81 (12%) patients demonstrated artifact. Movement artifact alone was present in 4; edge-enhancement artifact in 1; incorrect-centering artifact in 4 and one scan demonstrated all three types of artifacts. In one case of movement artifact, wavy distortion of the spinal fusion rods was not present on subsequent imaging. In 4 cases of widening exaggerating scoliosis, the measured widening was ≤ 4 cm in the chest (greatest transverse diameter). Bilateral iliac crest width increased ≤ 4 cm and exaggerated scoliosis, increasing Cobb's angle by up to 16° .

Conclusion: Movement and incorrect-centering artifact in EOS imaging were most prevalent. This can affect the degree of measured scoliosis and mimic hardware or other gross anatomical distortion. Radiologists must be aware of these shortcomings when reporting EOS films as it impacts management and may require repeat imaging. Due to the unexpected differences in thoracic and pelvic horizontal diameters, imaging standardization is required to improve reliability and monitor scoliosis via the Cobb angle which has proven variability.

Bibliography:

1. Melhem E, Assi A, El Rachkidi R, Ghanem I. EOS(®) biplanar X-ray imaging: concept, developments, benefits, and limitations. *J Child Orthop.* 2016 Feb 16;10(1):1–14.
2. Blumer SL, Dinan D, Grissom LE. Benefits and unexpected artifacts of biplanar digital slot-scanning imaging in children. *Pediatr Radiol.* 2014 Jul;44(7):871–82.
3. Simon A-L, Ferrero E, Larson AN, Kaufman KR. Stereoradiography imaging motion artifact: does it affect radiographic measures after spinal instrumentation? *Eur Spine J.* 2018 May;27(5):1105–11.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
202357th ANNUAL MEETING &
43rd POST GRADUATE COURSE**Thoracic spondylodiscitis as a rare complication of neonatal sepsis**Sofija Cvejic¹, Ivana Dasic¹, Tijana Radovic², Sandra Nedovic¹, Polina Pavicevic²

1. University Children's Hospital
2. University of Belgrade, Faculty of Medicine

Background: Infectious spondylodiscitis is a very rare entity in neonates, accounting for only a few percent of the bony infections in this population. It is most commonly caused by *S.aureus*, involving predominantly the lumbar region of the spine.

Case presentation: A female neonate was transferred from a regional hospital with a diagnosis of staphylococcal sepsis and a hyperechogenic mass in the right heart ventricle. The patient had high WBC count, CRP, D-dimer and low PLT count. Because of her critical condition, she was admitted to the ICU where she received adequate therapy. Surgery was performed to remove the infected thrombus in the right ventricle and the patient was discharged after two weeks, when the laboratory parameters were within the normal range. Three weeks later she came back with a COVID infection, fever and signs of pneumonia on radiography. She had high CRP and WBC count and received antibiotics again.

Results: Following radiographies showed complete regression of changes in lungs, but Th3 and Th4 vertebral bodies appeared destroyed, with loss of the intervertebral space. CT was performed for further evaluation and it confirmed that there were no pathological changes in lungs, but there was a visible destruction of three thoracic vertebral bodies with signs of soft tissue mass in the posterior mediastinum. MRI was suggested to evaluate contrast enhancement and involvement of the spinal canal. It showed an abscess formation located anteriorly and laterally to the spine with a complete destruction of Th3 vertebral body, subtotal destruction of Th2 and Th4 body and subsequent kyphosis. The spinal canal was narrowed and the spinal cord was compressed at the level of kyphosis, without signal intensity changes. VATS was performed to evacuate the long standing abscess that proved to be caused by *S.aureus*. There were no signs of abscess on the control MRI and the kyphotic deformity was unchanged.

Conclusion: Because of the atypical presentation, the diagnosis of a neonatal infectious spondylodiscitis is usually delayed, leading to the extensive destruction of the affected vertebra and subsequent deformities.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Neuroradiology

Vitamin B12 Myelopathy

Dr Awab Ali¹, Dr Ehab Hamouda¹, Dr Kate Taylor-Robinson¹, Dr Nicholas Barnes¹

1. Alder Hey Children's NHS Foundation Trust

Purpose: To demonstrate the characteristic MRI features of Vit B12 deficiency myelopathy and differentiate it from other common causes of myelopathy like demyelinating diseases in paediatric population.

Methods: We present two cases in the paediatric population with vitamin B12 myelopathy. Case 1 had a functional Vit B12 deficiency due to Nitrous Oxide misuse and case 2 had a nutritional deficit. The cases were presented with a history of lower limb weakness, altered sensation of vibration and position. Case 1 also had an altered fine touch and pain sensory level. In both cases, there was a long segment of symmetrical high T2 signal in the posterior column of the cervicothoracic spinal cord. Case 1, with an altered sensory level for pain and fine touch, also had a symmetrically high T2 signal in the lateral spinal tracts. Case 2 had low Vit B12 blood levels. Case 1 had normal Vit B12 blood levels, but the history of Nitrous Oxide abuse and the typical MRI findings supported the diagnosis of Vit B12 myelopathy. Treatment has been started for both cases.

Conclusion: Vitamin B12 deficiency may present with neurological manifestations related to dorsal spinal cord involvement. It's important to recognise the characteristic MRI findings of symmetrical posterior spinal cord involvement. As the degree of resolution of the clinical symptoms in Vit B12 deficiency depends on early detection, MRI findings should not be missed.

Imaging Findings and Complications of Mastoiditis: A Review

Dr Brenna McInerney¹

1. The Grange University Hospital, NHS Wales

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Objective: Mastoiditis is a common paediatric inflammatory condition affecting the mastoid air cells, which are located in the temporal bone. Radiological imaging plays a crucial role in the diagnosis and management of this condition. The purpose of this review is to summarise the typical imaging findings, important complications and mimics of mastoiditis.

Findings: The most common imaging finding in mastoiditis is opacification of the mastoid air cells, which is typically seen on CT or MRI. Imaging findings can be categorised into intra- and extra-cranial and intratemporal pathologies. In severe cases, complications such as subperiosteal abscess, facial nerve palsy, and intracranial extension of the disease may occur, and we will discuss the imaging findings and mimics.

Conclusions: Radiological imaging is essential in the diagnosis and management of mastoiditis. The typical imaging findings of mastoiditis include opacification of the mastoid air cells, bone erosion, thickening of the mastoid bone, and soft tissue swelling. Complications such as subperiosteal abscess, facial nerve palsy, and intracranial extension of the disease may occur in severe cases. Recognition of these imaging findings and complications is important for prompt diagnosis and appropriate management.

Safety considerations for cranial ultrasound in neonatal brain imaging

Christina Eftychia Mavrou¹, Dr. Marina Papadaki

1. Tzaneio General Hospital of Piraeus

Cranial ultrasound (CUS) is the primary imaging modality in the assessment of the neonatal brain because of its imaging quality, safety, low-cost, and portability. In addition it is radiation-free and allows serial imaging. All professionals who perform CUS should be aware of biosafety indices, as it can lead to direct thermal and mechanical effects in sensitive, developing neural tissue such as the neonatal brain. During the procedure, the transducer is usually placed in the anterior fontanelle, in direct contact with the dura mater and bone interferes within the beam. The latter, increases the probability of temperature rise to adjacent to the bone tissues. Energy output should be kept as low as reasonably achievable. Output display standards consist of two indices: the thermal index (TI) and the mechanical index (MI). The TI is an indicator of the relative potential for thermal effects while the MI indicates the probability of mechanical effects within the tissue that is examined. The higher exposure intensities are associated with

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

the pulsed Doppler mode. A lesser heating potential is associated with a low pulse repetition frequency. Contrast agents should be used with caution as they require a relatively high MI. Minimal time exposure is mandatory in order to minimise potential bioeffects. CUS is a valuable tool in the evaluation of neonatal brain and should only be performed by operators properly trained on ultrasound safety aspects. TI and MI are important indices, but full awareness of the ultrasound machine settings is crucial in order to minimize risk factors. CUS duration should be kept as short as necessary to provide a diagnostic scan.

Frequency, Patterns and Intracranial Associations of Cystic Encephalomalacia on Delayed MRI Scans of Children with Cerebral Palsy due to Term Hypoxic Ischemic Injury

Dana Alkhulaifat, MD¹; Shyam Venkatakrishna, MBBS¹; Luis Octavio Tierradentro-Garcia¹; Mohamed Elsingery, MD¹; Fikadu Worede, MD¹; Savvas Andronikou, MBBch, PhD^{1,2}

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, United States of America
2. Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, United States of America

Introduction: Cystic encephalomalacia develops in term perinatal hypoxic ischemic injury (HII) and is often referred to as catastrophic injury. However, imaging and associated findings of this condition have been poorly described. We aimed to define the different cystic patterns in children with term HII on MRI and determine the associated patterns of HII.

Methods and Materials: We retrospectively reviewed 1233 brain MRI reports of patients with diagnoses of term HII and identified patients diagnosed with cystic changes. These were classified as either *multi-cystic* or *focal* pattern, and each group was evaluated for associated injuries of the thalami, basal ganglia, hippocampi, cerebellum, and presence of ulegyria. We compared the frequency of injury involving the aforementioned locations between the two cystic encephalomalacia groups using Chi Square.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



Results: A total of 388/1233 (31.5%) children with term HII had cystic encephalomalacia. 207/388 (53.3%) patients had focal cysts and 181/388 (46.6%) had multi-cystic injury.

In the focal group there was thalamic injury in 87.9% (182/207), basal ganglia injury in 25.6% (53/207) and cerebellar involvement in 15% (31/207). A basal ganglia-thalamus pattern was present in 43.9% (91/207) and ulegyria in 69.6% (144/207).

In the multi-cystic group was thalamic injury in 88.9% (161/181), basal ganglia injury in 30.9% (56/181), and cerebellar involvement in 21% (38/181). There was a basal ganglia-thalamus pattern in 29.8% (54/181) and ulegyria in 28.7%. (52/181).

There was a significant association between the multi-cystic group and caudate involvement (OR, 1.9 [95% CI 1.2 to 3.3], $p=0.007$) and globus pallidus involvement (OR, 2.4 [95% CI 1.3 to 4.7], $p=0.007$). Focal pattern of injury demonstrated an association with the presence of ulegyria (OR, 0.18 [95%CI 0.12 to 0.28], $p<0.001$).

Conclusion: Cystic encephalomalacia is common (31.5%) in patients with term HII injury on delayed MRI, with similar prevalence of focal and multi-cystic injury. Cystic injury patterns, like other distributions of injury in HII, likely reflect duration and intensity of injury - multi-cystic injury was associated with caudate and globus pallidus involvement, typical of the BGT pattern of HII; the focal cystic pattern was associated with ulegyria, typical of watershed injury.

Evaluation of major intracranial artery Resistive Index in various degree of hydrocephalus

Dhananjaya Kotebagilu Narayana Vamyanmane¹, Ramesh R L², Naveen Benkappa², Niranjan, Pratheek², Uttam Shetty²

1. Sri Devraj Urs Academy of higher Education and Research Tamaka, Kolar, Karnataka, India.
2. Indira gandhi Institute of Child health Benagluru, karnataka, India

Purpose: Evaluation of Resistive Index (RI) in hydrocephalus.

Application of Resistive Index as marker tool for non-surgical management.

Establishing the standard value for considering surgical interventions in hydrocephalus.

Materials and Methods: Prospective study of neonates with various degree of hydrocephalus.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023**

**57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**



All the cases with mild, moderate and severe degree of hydrocephalus included in our study. V/H (Ventricle / maximum intracranial diameter) ratio used for assessing the degree of hydrocephalus.

Both communicating and non-communicating hydrocephalus were included.

Intracranial space occupying lesions, intraventricular hemorrhage, trauma and congenital anomalies of brain were excluded.

Duplex Doppler Ultrasonography of cranium done. Resistive index (RI) from Anterior cerebral and /or middle cerebral arteries were taken pre and post Tapping of CSF.

Statistical analysis was done for clinical significance.

Results:

- Total of 100 neonates were studied with inclusion criteria.
- There was a statistically significant positive correlation between degree of hydrocephalus and Resistive index (RI) in the MCA and/ or ACA.
- RI measurements with higher degree of hydrocephalus decreased significantly from a mean of 0.9 pre-tap to 0.7 post-tap.

Conclusion:

- Resistive index of ACA and / or MCA provides a reliable measure of cerebrovascular resistance in hydrocephalus.
- Clinical applications in Indication and timing of drainage procedure;
- Monitoring of effectivity of drainage procedure, detection of malfunction of external and internal drainage systems.
- Duplex Doppler ultrasonography thus is a useful noninvasive means of monitoring cerebrohaemodynamic change in infantile hydrocephalus.

Ultrasound Cranial Contents: A Review of Techniques and Pathologies

Emily Mayo¹, Zoe Nicholls¹

1. University Hospital of Wales, Cardiff, United Kingdom

Background: Normal ossification of the infant human skull occurs over the first 9-18 months of age. Fibrous suture fontanelles adjoin the two frontal, two parietal and single occipital bones,

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



enabling child birth and brain development. As the high acoustic impedance of ossified bone limits assessments of underlying structures, the presence of these fontanelles provide an aperture readily accessible for ultrasound analysis of cranial contents. Ultrasound is preferable to CT and MRI due to its ready availability, low cost and lack of ionizing radiation.

Indications: In the neonatal setting, ultrasound is used in screening and follow up of germinal matrix haemorrhage and periventricular leukomalacia for preterm and extreme low birth weight infants (<1500g). While the fontanelles remain patent, it is often the initial investigation for suspected congenital anomaly, hypoxic ischaemic injury, infection, seizures, causes for abnormal head circumference including benign enlargement of the subarachnoid spaces or subdural fluid collections.

Serial cranial ultrasound is also used to assess for intracranial haemorrhage in neonatal patients undergoing extra corporeal membrane oxygenation support.

Technique: A small footprint probe, high-frequency phased array transducer (5-8 MHz) normally yields best images. Linear probes (7.5MHz) can provide additional high resolution images. There may be technical challenges in positioning the probe, particularly for patients in incubators with multiple lines and tubes inserted. Distressed outpatients can also be challenging and help may be needed to maintain optimal head position.

The anterior fontanelle enables coronal assessment from the frontal to occipital lobes, and sagittal assessment of the midline, right and left hemispheres. Colour Doppler can assess vascular structures for pathology e.g. superior sagittal sinus thrombus. Depth, gain and focus settings should be optimized for best images.

Various measurements can be taken to assess degree of any hydrocephaly including coronal dimensions of the frontal horns at the level of the third ventricle, third ventricle width, thalamo-occipital distance.

Examples of pathologies: Large intraventricular germinal matrix haemorrhage with mass effect, later maturing to porencephalic cysts.

1. Lenticulostriate vasculopathy
2. Benign enlargement of subarachnoid spaces.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Pediatric Extra-ventricular Neurocytoma: The Often-forgotten Differential Diagnostic Consideration in Pediatric CNS tumors

Fabricio Guimaraes Goncalves¹, Carmen Cerron-Vela¹, Youck Jen Siu Navarro¹, Angela Viaene¹, Mariarita Santi¹, Savvas Andronikou¹, Arastoo Vossough¹, Karuna Shekdar¹

1. Children's Hospital of Philadelphia

Purpose/Objective/Background: Extraventricular neurocytoma (EVN) is a rare type of neuronal tumor that arises outside of the ventricular system and most commonly seen in adults. Despite exhibiting histopathological features similar to those of intraventricular central neurocytoma, EVNs may display a wide range of morphological variations and are often associated with frequent FGFR1:TACC1 fusions. EVNs are classified as grade 2 tumors by the World Health Organization. In this study, we evaluated the imaging characteristics of EVNs in pediatric patients.

Materials & Methods: We conducted a retrospective imaging review of nine consecutive cases of pathologically confirmed pediatric extraventricular neurocytoma (EVN) treated at a single center from 2008 to 2022. Detailed MR imaging features were reviewed, along with CT features, when available. Additionally, genotyping information was assessed wherever possible.

Results: Nine patients (7 male; 78%) were evaluated. Eight cases were in the cerebrum and one in the spinal cord. The most common clinical presentations were seizure (33%) and headaches (22%). The most common locations were frontal (33%) and parietal lobes (22%). Cortex was involved in 44% and white matter in 67%. All were T2 hyperintense and 89% were T1 hypointense. Enhancement was seen in 89% of cases. A solid lesion was seen in 56% of cases and a cystic lesion with an enhancing nodule was seen in 44% of cases. Susceptibility (blood/calcium) was seen in 67% of cases. None exhibited diffusion restriction. Little to no mass effect was observed in 55% of cases and moderate/severe in 45%. Focal bone remodeling was seen in 33% of cases.

Conclusions: Pediatric EVN is a rare neoplasm with a range of imaging appearances and typically presenting with seizures or headaches during middle childhood and adolescence. They are generally solitary frontoparietal lesions with variable size and a solid or cystic-solid

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



appearance often exhibiting mild to moderate peritumoral edema/mass effect and susceptibility artifacts (blood/calcifications). EVNs should be considered in the differential diagnosis of solitary solid/solid-cystic, hemorrhagic/calcified, enhancing lesions in school-age children. Although no definitive features have been identified, recognition of these imaging characteristics can aid in the accurate diagnosis and management of EVN in pediatric patients.

Advanced MRI sequences in pediatric neurovascular diseases. A comprehensive review

M. Ibnoukhatib¹, M. Gómez-Chiari², J. Muchart³, J. Wieckowski⁴, M. C. Planells Alduvin⁵, V. Gonzalez Alvarez⁶, C. J. Garcia⁷, I. Barber⁸, J. Munuera⁹

1. Hospital Vall d'Hebron. Barcelona/ES
2. M. Gómez-Chiari. Hospital Sant Joan de Deu. Barcelona/ES J.
3. Muchart Hospital Sant Joan de Deu. Barcelona/ES J.
4. Wieckowski Hospital Sant Joan de Deu. Barcelona/ES
5. M. C. Planells Alduvin Hospital Sant Joan de Deu. Barcelona/ES
6. V. Gonzalez Alvarez Hospital Sant Joan de Deu. Barcelona/ES
7. C. J. Garcia Hospital Sant Joan de Deu. Barcelona/ES
8. I. Barber Hospital Sant Joan de Deu. Barcelona/ES
9. J. Munuera Hospital Sant Joan de Deu. Barcelona/ES

Purpose/Objective/Background: We currently have a large range of techniques available in contemporary neurovascular practice. The aim of this study is to highlight and analyze the different advanced MRI sequences, in pediatric neurovascular diseases.

Memthods: This study is a retrospective review of 200 patients with neurovascular pathology. They were studied with 3 Tesla MRI using advanced MRI sequences for their vascular study.

Results: We report illustrative cases diagnosed in our center of vascular pathology with advanced MRI sequences including patients with PHACES syndrome, moya moyo disease, cerebral proliferative angiopathy, arteriovenous malformations, arteriovenous fistula, pial arteriovenous fistula, aneurysms and ischemic stroke.

This patients were studied with triggered angiography non-contrast-enhanced magnetic resonance imaging (TRANCE-MRI), Arterial Spin Labelling (ASL), Relaxation-Enhanced

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Angiography without Contrast and Triggering (REACT), MRI with acetazolamide administration and susceptibility sensitive sequences.

We here explore the diagnostic performance of the different advanced MRI sequences, used in each case, for the evaluation of the vascular pathology. Then we compare the efficacy of these techniques in order to define in which case each of the methods is indicated.

Conclusions: Advanced MRI sequences are necessary to characterize neurovascular lesions and can be used as an alternative and objective tool for assessing vascular suspected pathology. Moreover, it is a non-invasive diagnostic tool. Using these diagnostic techniques, specially in pediatrics, is useful and can sometimes avoid using more invasive techniques such as arteriography.

Frequency and distribution of Perinatal arterial ischemic stroke in a cohort of patients with Cerebral Palsy using Delayed MRI

Mohammad Jalloul MD¹, Shyam Sunder B Venkatakrishna, MBBS¹; Savvas Andronikou, MBBCh, PhD, PhD, FRCR, FCRad (Diag)¹

1. Department of Radiology, Children's Hospital of Philadelphia, Philadelphia, PA, United States of America

Background: Perinatal arterial ischemic stroke [PAIS] describes disruption of cerebral blood supply focally, between 20 weeks gestation to 28 postnatal days, usually confirmed on neuroimaging. Usually the middle cerebral artery (MCA) is involved, usually unilateral on the left. Watershed (WS)infarcts are distinct from PAIS. We aimed to characterize distribution and associated injuries in children with PAIS on delayed MRI in a database of children with Cerebral Palsy and suspected term hypoxic ischemic injury (HII).

Materials and Methods: Retrospective review of MRI scans in children (0-18 years) with CP and suspected term HII, including reports with keywords: PAIS, stroke, infarct, infarction. Infarct side and location were recorded along with associated cystic changes, ulegyria, deep nuclei lesions, or additional WS HII.

Results: Of 1620 children with CP, 15 (1%) had PAIS with mean age of 6.07 years [SD: 4.01 with age range of 2 – 17 years] compared to 1175 (73%) with term HII. Infarcts were unilateral in 14 (93%) - 9 left-sided (60%), and 5 right-sided (33%) - and bilateral in 1 (7%), with a larger

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June





left infarct. In addition to PAIS, there were cystic changes in 10 (67%), ulegyria in 1 (7%) and concomitant HII in 7 (47%) - BGT (basal-ganglia-thalamus) pattern in 3 (20%), watershed (WS) pattern in 2 (13%), and a combined BGT/WS pattern in 2 (13%). In the absence of a BGT HII, deep nuclei injuries were present in 6 children (40%) - thalamic in 5 (33%); putamen and globus pallidus in 3 (20%); caudate in 2 (13%). The MCA was the only injury site in 13 (87%) [left 7 (47%); right 5 (33%) bilateral in 1 (7%)]; ACA and the PCA were affected in 1 child (7%) each (left in both).

Conclusion: Only a small proportion (1%) of patients imaged to determine the cause of CP had PAIS. The most common location of infarct was the left MCA. Almost half (47%) of children had accompanying HII including BGT HII (20%), WS HII (13%), and combined HII (13%).

Acute necrotizing encephalopathy following Influenza A viral infection: a case report

Nataša Milčanović¹, Živana Cvijan-Stevančević¹

1. University Children's Hospital

Background: Acute necrotizing encephalopathy (ANE) is a rare neurological disease that most commonly affects previously healthy children. It is most prevalent in East Asia, but has been reported in other parts of the world. Influenza A is a leading cause of ANE.

Methods: We present a case report of ANE in previously healthy child as a complication of acute respiratory infection caused by Influenza A virus. Clinical characteristics, laboratory investigations as well as radiological features has been described.

Materials: We used well known specific criteria for diagnosing ANE including: 1) acute encephalopathy following febrile viral infection, convulsions and deterioration in the level of consciousness; 2) elevation of serum transaminase; 3) increased cerebrospinal fluid proteins without pleocytosis; 4) typical neuroimaging findings; 5) exclusion of resembling diseases.

Results: Our case qualified all the criteria for diagnosing ANE. The patient was previously healthy 15-month-old boy with reported history of fever (40°), vomiting and diarrhea one day prior to hospitalization. He was admitted after recurrent convulsions and rapid deterioration in the level of consciousness. Laboratory investigations showed elevated levels of liver

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

transaminase and C-reactive protein while there were low level of leukocytes and lymphocytes. Lumbar puncture was performed on the day of admission, which showed slightly elevated cerebrospinal fluid protein and glucose without pleocytosis. Multiplex PCR respiratory panel test were positive for Influenza A virus. Head computed tomography examination at the time showed multiple, symmetric hypodense supra and infratentorial lesions in both thalami, dorsal pons and cerebellar white matter without postcontrast enhancement. Three days after hospitalization, magnetic resonance imaging was performed. There were typical multifocal, symmetric, T2W/FLAIR hyperintense, T1W hypointense lesions with restrictive diffusion and without postcontrast enhancement. Bilateral thalami, putamina, posterior limbs of capsule interna, periventricular and deep cerebral white matter, cerebellar white matter and brain stem tegmentum were affected. Thalami showed microhemorrhage as well. Thus, the patient was diagnosed with ANE.

Conclusions: ANE is a rare neurological complication of viral infection in children, but we should be aware of clinical, laboratory and radiological criteria in order to adequately diagnose this entity.

Perineural arachnoidal Gliomatosis: A Unique Growth Pattern In A Patient Without Neurofibromatosis Type-1

Omer Faruk Simitcioglu¹, Eda Almus¹, Mustafa Hurmuzlı¹, Özge Yapıcı¹

1. Marmara University School Of Medicine, Department Of Radiology

Background: Optic nerve gliomas are low-grade neoplasms occurring in pre-cortical visual pathways. This pathway includes the optic nerve, optic chiasm, optic tracts, optic radiations, and hypothalamus. This entity can arise sporadically or due to neurofibromatosis type-1 (NF-1). Optic nerve gliomas are classified into two groups, intraneural and perineural, according to their growth patterns. Intraneural optic gliomas, the most common type, invade through intraneural fascicles. Whereas in the perineural type, called perineural arachnoidal gliomatosis (PAG), leptomeninges is invaded and neoplastic cells proliferate in subarachnoidal space while the optic nerve remains unaffected. PAG is seen almost exclusively in NF-1 patients. We

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



present an exceedingly rare case of optic nerve glioma with PAG who has not been diagnosed with NF-1.

Case Presentation: 5 year-old male without any past medical history presented to the pediatric outpatient clinic with recent proptosis in the right eye. His examination has failed to show any abnormalities except for right proptosis. His left optic nerve was atrophic on ophthalmologic examination. Afterward, the patient underwent an orbital magnetic resonance imaging (MRI). MRI scan revealed expansion and contrast uptake in the right optic nerve as well as encasement of the nerve by soft tissue. The optic nerve also showed tortuosity. The optic nerve lesion did not show diffusion restriction. According to our hospital's protocol, a brain MRI scan was done, which failed to show any intracranial pathology. The patient's parents refused to give consent for further workup and biopsy. Based on the MRI findings, an optic nerve glioma with PAG was diagnosed. Afterward, chemotherapeutic treatment is given. Informed consent was obtained from the patient's parents.

Conclusion: In conclusion, PAG is a subtype of optic nerve glioma primarily seen in NF-1 patients. Nonetheless, as in our case, PAG is not an NF-1 exclusive entity. A differential diagnostic list of the orbital tumors is of great value in PAG due to overlapping radiological features and nonspecific clinical symptoms. Pseudo-CSF sign can help diagnose PAG.

Imaging of Mastoiditis and its Complications in Paediatric Population

Rusul Yonis¹, Dr.Ghadir Kassab¹

1. Department of Radiology at Alder hey children's hospital - NHS

Introduction: Mastoiditis is a commonly encountered condition in paediatrics with an array of very sinister complications. Therefore, it is crucial for radiologists to be well versed in diagnosing mastoiditis.

Aim: An educational poster aiming to give an overview of mastoiditis, focusing on the imaging modalities used in diagnosing the pathology and its complications by exhibiting several images from cases encountered recently in practice at Alder Hey Children's Hospital.

Overview of the poster: Mastoiditis is the most common and serious complication of acute otitis media. It is primarily a pathology of the paediatric population, and most frequently result

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

from bacterial infections, with *Streptococcus pneumoniae* and *Haemophilus influenzae* accounting for 65-80% of cases.

Radiological diagnosis: Imaging is the corner stone of diagnosing mastoiditis and its complications. Contrast enhanced Computed tomography (CECT) is the initial investigation of choice used to classify the mastoiditis as incipient or coalescent and to detect intracranial complications such as cerebral abscesses and dural venous thrombosis.

Magnetic resonance imaging (MRI) is performed in patients with clinical symptoms or CT findings suggestive of intracranial complications because of its higher sensitivity for detection of extra-axial fluid collections, cerebritis, and associated vascular problems.

Conclusion: In summary, mastoiditis is a common pathology readily seen in paediatric practice with serious and fatal sequelae. Therefore, it is imperative for radiologists to keep a low suspicion index and to be proficient at diagnosing mastoiditis and its complications to allow early intervention.

Imaging of anophthalmia – a case study

S.Mladenovic¹, V.Stokanovic¹

1. Department of radiology, Clinical centre Nis

Background: Anophthalmia represents a congenital disorder manifested by complete absence of the eye and is often associated with aplasia of orbital structures, such as the optic nerve or oculomotor muscles, the chiasma and optic pathway. Studies have linked anophthalmia with various ethiological factors, environmental and genetic, both groups affecting the first 8 weeks of prenatal life. In embryological terms, this disorder occurs as a result of developmental failure of the anterior neural tube or optic pit.

Anophthalmia can be unilateral or bilateral; primary, in most cases of genetic etiology, with agenesis of the globe, or secondary, in which case the globe/bulbar tissue can be present, but extremely hypoplastic, measuring below the 5th percentile.

Imaging, aside from clinical examination and genetic research, is an inseparable part of the diagnostic process, also allowing physicians to distinguish whether anophthalmia is isolated, or a part of a syndrome. Hence different imaging modalities – ultrasound, CT or MRI enable prenatal and postnatal diagnosis of orbital pathology and associated craniofacial, cardiac or abdominal anomalies.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Objective: MRI is the modality of choice in prenatal and postnatal diagnosis. Main advantages of MRI imaging include high sensitivity and specificity, which enable a detailed insight in orbital and adjuvant abnormalities, as well as the fact that this modality allows radiation – free imaging, a major bonus in pediatric patients.

Results: We present a case of a 9-year-old male patient, without prior medical history. Clinical examination was highly suggestive of bilateral anophthalmia and could not exclude other potential developmental anomalies. An MRI examination of the head was performed using 3T Philips MRI scanner, following the standard endocranium protocol and focused orbital tomograms. Analysis of the obtained tomograms showed a case of isolated bilateral anophthalmia.

Conclusion: MRI is a powerful tool that gives insight in orbital pathology, taking part both in prenatal and postnatal assessment of this pathological entity and is a preferred diagnostic modality when available.

MR imaging in children with pituitary endocrinopathies

Denić Saša¹, Golubović Milan², Stokanović Vesna³, Milena Trandafilović¹, Spasić Jelena³, Stojanov Dragan³

1. Faculty of Medicine, University of Nis, Serbia
2. Clinic of pediatrics, University clinical center Niš, Serbia
3. Center for radiology, University clinical center Niš, Serbia

Purpose/Objective/Background: Magnetic resonance imaging (MRI) is the modality of choice for evaluation of pituitary anatomy and morphological alterations. The objective is to present our findings in children with endocrinopathies who underwent MRI examination of pituitary gland during the last 3 years. Additionally, we describe typical MRI findings of pituitary disorders we encountered.

Methods: This is a retrospective study that analyzed MRI findings of pituitary gland in pediatric population. The examinations were performed on Philips Integra 1.5 T and General Electronics 3T MRI scanner. T2-weighted, T1-weighted (T1w) and T1w contrast enhanced images in two planes were obtained.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Materials: This study included patients 0-18 years of age with laboratory confirmed hormonal imbalance or clinical signs of pituitary disease who underwent pituitary MRI examination in Center for radiology, University clinical center Nis from January 2020 until March 2023.

Results: Total of 61 subjects were identified (36 girls and 25 boys, mean age 13.1) and majority of them were teenagers (65.6%). Dominant hormonal changes were growth hormone and prolactin imbalance. Most of patients clinically presented with symptoms of hypopituitarism, growth failure, delayed puberty, precocious puberty and diabetes insipidus. Abnormal findings were as follows: microadenoma in 13, pituitary hypoplasia in 8, macroadenoma in 3 and absent posterior pituitary in 2 patients. We recorded one case of pituitary apoplexy, one arachnoid cyst of suprasellar region and two cases of hypophysitis. One patient presented with cystic pituitary adenoma.

Conclusion: Our study showed a variety of MRI structural pituitary anomalies in children with endocrinopathies. Although half of the patients showed normal MR morphology, imaging of pituitary-hypothalamic axis is essential diagnostic method in assessing local anatomy and underlying etiology. These findings in correlation with laboratory and clinical presentation lead to correct treatment and evaluation of the severity of endocrine-related disorders.

Managing a Complex and Challenging Case of Severe Occipital Meningoencephalocele and Obstructive Hydrocephalus: A Multidisciplinary Approach

Valentina Ferrer Valencia¹, Gustavo Adolfo Triana Rodriguez², José David Cardona Ortegón², Angela Patricia Guarnizo Capera²

1. Universidad El Bosque

2. Fundación Santa Fe de Bogotá

Background: Severe occipital meningoencephalocele and obstructive hydrocephalus requires an integrated approach. Accurate classification of the severity of the condition is crucial for diagnosis, treatment, and prognosis.

Case Presentation: A male patient was diagnosed prenatally with interhemispheric cyst and occipital meningoencephalocele and presented with obstructive hydrocephalus. Brain imaging revealed macrocephaly, absence of the septum pellucidum, and dysgenesis of the corpus callosum. The patient underwent ventriculoperitoneal shunt placement, and follow-up imaging

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

studies confirmed appropriate shunt placement and correction of meningoencephalocele, as well as a decrease in ventricular size. The severity of the patient's condition was attributed to alobar holoprosencephaly, a structural anomaly of the brain resulting from incomplete forebrain division during early gestation.

Conclusions: The successful management of complex cases of severe occipital meningoencephalocele and obstructive hydrocephalus requires multidisciplinary treatment involving neurosurgeons, radiologists, and neonatologists. Accurate classification of the severity of the condition is crucial for diagnosis, treatment, and prognosis. Timely and appropriate intervention, including surgery and follow-up imaging studies, is essential for patients' well-being and long-term prognosis. This case highlights the importance of such an approach in managing these challenging cases.

MR fingerprinting at child brain

Zorica Joković¹, Marija Mijaljević², Nevena Lazović¹, Dušan Banovac¹

1. Department of Radiology, University Children's Hospital, Medical Faculty, Belgrade, Serbia

2. Department of Radiology, Institute of Oncology and Radiology of Serbia, Medical Faculty, Belgrade, Serbia

corresponding author dr.z.jokovic@gmail.com

Background: Only a few, deep learning algorithms have been applied to infant magnetic resonance imaging (MRI). The reason is that the tissue is inhomogeneous appearance because the imaging intensity is variable during the first year of life. This paper reviews the basic concept of MR fingerprinting (MRF) in the developing, neonatal brain. MRF is a fast, multiparametric quantitative imaging. Nearly any sequence can be used in MRF acquisition, and multiple sequences can be combine in a single acquisition. Usually used sequences are T1-weighted (T1w), and T2-weighted (T2w) for mapping. The MRF techniques have been mostly validated using phantoms.

Methods: We used PubMed, Google Scholar, and Medline as bibliographic databases containing many journal articles. The keywords were MR fingerprinting, MRF, neonatal, pediatric, and child's brain. The filter was only human.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Results: We found 22 papers, but only 6 papers satisfied these keywords. Most of them were about preterms and only one was about quantitative measurements in the first five years of life. For MRF they used T1w, and T2w for quantitative tissue mapping and myelin water fraction (MWF) for developing the brain during the time. MRF includes signals from wide ranges of T1 (60 to 5000ms) and T2 (10~500ms) values. All 28 children, ages from 2-60months were enrolled in the UNC/UMN Baby Connectome Project. Quantitative T1 and T2 maps were generated simultaneously, and it need ~34 sec. while calculating MWF maps ~9 sec. Quantifications of T1, T2, and MWF were obtained in children's brains with performed the region of interest (ROI) analysis of the white matter. They found the age-related differences in relaxivities that follow the logarithmic model, while the MWF pattern exhibits negligible values until 6 months of age, and gradually increases. Tissue relaxation properties change very fast because reflecting the physiological changes in early brain development.

Conclusions: This paper found that MRF techniques have great potential as a multi-parametric assessment of normative brain development in the early years of life. Also, there is a potential for measurement of MWF in brain development anomalies.

Significance of multicomponent T2 relaxometry in pediatric neuroimaging

Zorica Joković¹, Dušan Banovac¹, Nevena Lazović¹

1. Radiology department, University Children's Hospital, Belgrade, Serbia

Background: The term relaxometry was introduced in 1986, by Koeng et al. And since then, it has been widely used to quantify various biophysical characteristics of different tissues, thereby removing biases during qualitative interpretation and enabling more accurate follow-up. T2 relaxometry represents a measurement of T2 relaxation rate in the area of interest by creating a map, generally using spin-echo sequences with two or more different times of echo (dual-echo or gradient echo sequences) with corresponding signal intensities and a long time of repetition (vary between various studies, usually in the range of 3000 - 10000 ms) as parameters.

The purpose of our study is to unify all existing clinically relevant papers considering the usage of T2 relaxometry in pediatric neuroimaging into one coherent and potentially usable study.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Materials and methods: We gathered our material through research of available online medical libraries such as PubMed and Google scholar, for papers published in the English language in the past 10 years, respectively, with keywords beginning: T2 relaxometry, human, pediatric, brain disease, and neuroimaging.

Results: Through our research, we found several relevant papers, mostly cross-sectional, smaller cohort studies, in which T2 relaxometry was used as prediction and follow-up method. A special challenge is the follow-up of children under the age of two, in whom the normal T2-relaxation values of the white matter (major and minor forceps $T2=404.4\pm 8.1$ ms, corpus callosum $T2=228.6\pm 3.6$ ms) differ significantly from those of adults ($T2\sim 80-90$ ms) due to the myelination. This is important for predicting and detecting many conditions and diseases affecting white matter, such as childhood absence epilepsy, cerebral palsy, and assessment of brain maturity in preterm infants. T2 relaxometry was also used in: Friedreich's ataxia, seizure outcome in solitary cerebral cysticercosis, brain abnormalities in patients with single ventricle heart disease, and differentiation in brain ring lesions.

Conclusion: There are not many published studies regarding T2 relaxometry in pediatric neuroimaging, however, through our literature review, those that do exist, show great promise in the use of this method in a variety of pathologic findings including infectious, metabolic, congenital, and extracerebral diseases and conditions affecting the brain.

Oncology

Pleuropulmonary Blastoma (PPB): Clinical case report

Dr. Dusan J. Petrovic (M.D.)¹, Prof. Dr. Pavicevic Polina (M.D., Ph. D.)²

1. Department of Diagnostic Imaging, Center of Radiology and MRI, Clinical Center of Serbia, University of Belgrade, School of Medicine, No. 2 Pasterova Street, Belgrade 11000, Serbia, Phone: +381648742761, email: dusanpetrovic736@gmail.com

2. University Children's Hospital, Belgrade, Serbia, email: pzmbov@yahoo.com

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Pleuropulmonary blastoma (PPB) is a very rare tumor of the chest seen predominantly in young children with great heterogeneity and clinical, biochemical, and biological complexity and recognized, described, and classified as distinct from the pulmonary blastoma typically encountered in adults. Unfortunately, it has a poor prognosis and is mainly classified as cystic (type 1), mixed type (type 2), and solid (type 3). Herein, we present one case of PPB type 2 presenting clinically with a right pulmonary abscess, a rare clinical presentation of PPB, which was initially treated with surgery, and after approximately one year of follow-up, pulmonary rest-recurrence and central nervous system secondary deposits were detected. When a large pleural-based mass is identified in a young child, PPB should also be considered, especially in a patient with a positive oncological family history. Suggestive findings include the absence of chest wall invasion, presence of pleural fluid, right-sided location, and heterogeneous native (NECT) low attenuation with variable postcontrast enhancement. The authors believe that a modern therapeutic approach should take these results into consideration for a better understanding of the genetic nature and complex mechanism and process of PPB disease development (both clinical and preclinical data concerning PPB pathophysiology are still lacking and are not completely understood), so that it would be possible to establish new possible therapeutic options (i.e. nuclear medicine theranostics in PPB treatment) and approaches, and so that, given the severity of the disease, it would be possible to indicate the importance of genetic testing and counseling of close relatives.

Keywords: Pleuropulmonary blastoma type 2, right pulmonary abscess, thoracotomy, DICER 1 syndrome.

Very rare but characteristic ultrasound appearance of bilateral multiple large-cell calcifying Sertoli cell tumor of the testis in an adolescent

Ercan Ayaz¹, Nurettin Okur², Selver Özekinci³

1. Department of Radiology, Diyarbakır Children's Hospital, Diyarbakır, Türkiye
2. Department of Pediatric Oncology, Diyarbakır Children's Hospital, Diyarbakır, Türkiye
3. Department of Pathology, Dicle University Medical School, Diyarbakır, Türkiye

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



Background: Sex cord-stromal tumors constitute 2-5% of all testicular neoplasms and one of the rarest types of this group is large-cell calcifying Sertoli cell tumor (LCCSCT). Our aim is to represent a case of bilateral multiple LCCSCT with typical ultrasound findings.

Case Presentation: A 16-year-old male patient was admitted to our clinic with scrotal pain and focal firmness in the scrotum. On physical examination, small masses were palpated in both testes. The hormone levels (testosterone, FSH and LH) and tumor markers were within the normal range as; alpha-fetoprotein (AFP) 0.9 ng/mL, β -Hcg: 0.1, and LDH: 148 U/L. On ultrasound (US), bilateral multiple testicular masses, including extensive coarse calcifications were demonstrated. The largest mass was measured at 12x9 mm on the right and 13x10 mm on the left testis. The volumes of the testes were normal by age as 11.3 cm³ for the right and 11.5 cm³ for the left testis. Other intrascrotal structures were normal, and there was not any extratesticular lesion. Since the masses involved the majority of both testes, surgical excision could not be performed. Instead, a core needle biopsy was carried out from both testes. Histopathologic examination revealed large neoplastic cells, including granular cytoplasm and giant oval nuclei. Cells were organized in a pattern of solid cords and islets. Extensive calcifications were seen within the tumor, and some of those had psammoma bodies. Immunohistochemical tests showed positivity for calretinin and inhibin; absent reactivity for cytokeratin 5/6, SALL4, and CD117. These findings confirmed the diagnosis of LCCSCT. At the 6, 12, and 18 months of follow-up examinations, the patient was asymptomatic, tumor markers were normal, and lesions were grossly similar.

Conclusion: Pediatric testicular tumors are rare, most of which are germ cell tumors. The vast majority of them are solitary, and ultrasound findings are non-specific. LCCSCTs occur with a frequency of 0.4–1% pediatric testis tumors. Among these tumors, 20-30% are bilateral and multiple. Ultrasound features of LCCST are characteristic of multiple solid lesions, including extensive calcifications. Bilateral multiple tumors almost always show a benign course; therefore, defining the diagnosis with sonographic findings is very important.

Giant desmoid fibromatosis after hip luxation surgery-imaging characteristics

Ivana Dasic¹, Sofija Cvejic¹, Tijana Radovic¹, Jelena Lazic¹, Polina Pavicevic¹

1. University Children's Hospital, Belgrade, Serbia Faculty of Medicine, University of Belgrade

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

Background: Desmoid tumors are rare soft-tissue neoplasms, especially in children. Although they do not have metastatic potential, they can exhibit aggressive growth and local invasion. Possible association with the familial adenomatous polyposis (FAP) is described, but also the history of previous injury or surgery. The most common localization of extra-abdominal pediatric desmoid tumors are the extremities, followed by the head and neck region, and the rarest location is within the abdominal wall. Multiple treatment plans have been proposed in children.

Case presentation: An 11-year-old girl was admitted to the University Children's Hospital in Belgrade due to a large painless mass above the left iliac crest. The mass was observed to be firm, non-tender and fixed to the abdominal wall. Parents stated that the mass was gradually increasing in size over the past year. The girl had surgery on her left hip four years ago in another institution. Laboratory findings and tumor markers were within normal limits.

Ultrasound (US) revealed the presence of a large heterogeneous tumor formation, measuring about 10 cm with pronounced vascularization with color doppler and close contact with the left iliac bone. In order to evaluate the bone structures and intra-abdominal propagation, a CT scan of the pelvis and hips as well as MRI of the abdomen and pelvis was done. CT-scan shows low-attenuation mass permeated with numerous irregular, slightly hyperdense septa and diffuse inhomogeneous enhancement after contrast agent administration. On MRI large tumor mass was relatively clearly defined with lobulated appearance, localized at the level of the musculature of the lateral wall of the abdomen, between the outer and inner oblique muscles, with diffusion restriction and moderate inhomogeneous postcontrast opacification.

Results: Surgical biopsy was done and histological diagnosis was desmoid fibromatosis. After chemotherapy there was no tumor regression and due to the size of the mass, radical resection was performed. The patient remains in good health and complete remission without any other treatment following surgery.

Conclusion: The diagnosis of desmoid fibromatosis should be considered in patients with an abdominal wall mass with a history of previous surgery or injury. Unlike other localization, the therapy of abdominal wall desmoid tumors remains aggressive and includes complete surgical resection.

Radiologic imaging findings in graft versus host disease in children

Joanna Abi Ghosn¹, Karim Bergaoui¹, Fanny Falaque², Asma Louati¹, Carmen Ioana Lung¹, Alexandra Ntorkou¹, Anca Tanase¹, Marianne Alison¹.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

ESPR
2023

57th ANNUAL MEETING &
43rd POST GRADUATE COURSE



1. Department of Pediatric Radiology, Hôpital Robert Debré
2. Department of Pediatric Immunology and Hematology, Hôpital Robert Debré

Purpose: Illustrate the presenting symptoms and describe common imaging findings in clinically suspected GVHD to guide urgent treatment.

Material and methods: A review of the common imaging findings in most involved systems in GVHD will be presented.

Cases of GVHD have been extracted from our data base, and most interesting cases will be presented.

Results: Imaging is indicated once GVHD is suspected after haematopoietic stem cell transplantation, a serious complication mostly involving the skin, gastrointestinal tract (mainly small bowels and liver) and pulmonary system.

Radiological findings are non specific, but common imaging features can suggest the diagnosis, assess disease severity, and guide the appropriate management.

Imaging is also essential to exclude other potential complications after haematopoietic stem cell transplantation (infections, hemorrhage, etc...).

Conclusion: Radiologists should be aware of the common imaging findings of GVHD, thus suggesting promptly the diagnosis and guide management.

References:

1. Pandey T, Maximin S, Bhargava P. Imaging of complications from hematopoietic stem cell transplant. *Indian J Radiol Imaging* 2014;24:327-38.
2. [Meghan G. Lubner, Christine O. Menias, Michelle Agrons, Kinan Alhalabi, Venkata S. Katabathina, Khaled M. Elsayes, et Al. Imaging of Abdominal and Pelvic Manifestations of Graft-Versus-Host Disease After Hematopoietic Stem Cell Transplant.](#) *American Journal of Roentgenology* 2017 209:1, 33-45
3. [Noninfectious Pulmonary Complications after Hematopoietic Stem Cell Transplantation: Practical Approach to Imaging Diagnosis.](#) Elena Peña, Carolina A. Souza, Dante L. Escuissato, Marcio M. Gomes, David Allan, Jason Tay, and Carole J. Dennie. *RadioGraphics* 2014 34:3, 663-683
4. [Musculocutaneous Chronic Graft-Versus-Host Disease: MRI Follow-Up of Patients Undergoing Immunosuppressive Therapy.](#) Marius Horger, Wolfgang Bethge, Andreas

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

[Boss](#), [Michael Fenchel](#), [Claus D. Claussen](#), [Marc Schmalzing](#), and [Wichard Vogel](#). American Journal of Roentgenology 2009 192:5, 1401-1406.

Inflammatory myofibroblastic tumor of the urinary bladder in 13-year-old girl

Dr. Małgorzata Szorc¹, Dr. Kinga Kowalczyk¹, Prof. Elżbieta Jurkiewicz¹

1. Children's Memorial Health Institute

Introduction: Inflammatory myofibroblastic tumor (IMT) is a rare intermediate soft tissue tumor arises from various organs, such as the lung, omentum, abdominal cavity, and retroperitoneum. In 2020, the WHO reclassified IMT as a specific tumor form in the category of intermediate (rarely metastasing) fibroblastic/myofibroblastic tumors. IMT of the urinary bladder is extremely rare comprising less than 1% of all bladder tumors. Bladder IMTs are more frequently found in young women than in men and are rare in children. Surgical resection is the treatment of choice and the prognosis of IMTs of bladder is relatively good.

Case report: We describe a case of bladder IMT in a 13-year-old girl who presented to the urologist complaining of recurrent dysuria, hematuria and lower abdominal pain. Urine samples showed erythrocyturia and proteinuria.

Ultrasonography revealed a 37x30x30mm heterogeneous mass located in the upper anterior wall (below urachus) with signs of internal vascularity in Color Doppler CD and SMI (superb microvascular imaging). The urologist suggestion was at first inflamed urachus.

Contrast enhanced ultrasound (CEUS) showed strong enhancement in early arterial phase and irregular but fast wash out what exclude diagnose of inflamed urachus and lead us to suspicion of malignant tumor.

Pelvic MRI demonstrated the 37×27× 27mm broad-based mass, suggesting submucosal tumor in the wall of the bladder. The mass showed low-to-moderate signal intensity on T1-weighted images and slight high signal intensity on T2-weighted images and restricted diffusion with low signal intensity on ADC map and abnormal high signal intensity on DWI. After contrast injection enhancement was irregular, what suggested the possibility of leiomyoma.

The tumor was removed within healthy tissues, microscopically: inflammatory myofibroblastic tumor.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE**

An oncogenetic study was ordered - the result is still in development.

Conclusion: IMT is a borderline tumor with generally good prognosis but up to 35% may recur and distant metastasis may occur. Therefore, periodic follow-up examinations are required.

Atypical manifestations in CNS in children with leukemia

Mariana Planells Alduvin¹, Jordi Muchart López¹, Anna Faura Laura Arques¹, Jaroslav Smiechowicz¹, Marta Gomez-Chiari¹

1. Hospital Sant Joan de Deu

Purpose: The purpose of this study is to present atypical findings of CNS manifestations due to leukemia in children at the moment of diagnosis or during treatment.

Methods and materials: We did a revision of atypical findings due to leukemia in our hospital.

Results: By direct or hematogenous spread, leukemic cells can infiltrate virtually any anatomic location.

Due to the rise in survival rates, the frequency of central nervous system infiltration and complications has increased. The manifestations in the central nervous system seen in leukemia may involve the leptomeninges, brain parenchyma, cerebral vasculature or the bone structure. The most common neuropathology in our series was leukemic meningitis. Leukemic involvement of the subarachnoid space can be identified in MRI as abnormal enhancement of the meninges and nerve roots. More rarely we had patients with nerve infiltration such as infiltration of the optic nerve as well as facial and acoustic nerves. One patient had cerebral cortex infiltration and another patient presented a medullary compression due to an epidural lesion with soft tissue infiltration which included the penis.

Conclusions: A wide spectrum of findings can be found in the CNS due to leukemia. Early diagnosis of the manifestations is essential because many are treatable. Improved imaging techniques aid in the characterization of CNS involvement in leukemia.

BELGRADE, SERBIA / Crowne Plaza Hotel

05 - 09 June

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Testicular Yolk Sac Tumour: What the Radiologist Needs to Know**Mikel Elgezabal¹, María Berastegui²; Iskander Arteche²; Sara García²

1. University of the Basque Country. Cruces University Hospital. Department of Radiology.
2. SERAM (Sociedad Española de Radiología Médica) - Spanish Society of Medical Radiology

Purpose/Objective/Background: To sum up available evidence on prepuberal testicular yolk sac tumours and present it from a radiology viewpoint. To provide the reader with all necessary information in order to diagnose and manage testicular yolk sac tumours.

Methods: Review of relevant literature on testicular yolk sac tumours, adding illustrative examples and our own experience from cases collected from our Institution—a reference hospital for Paediatric Medicine and Surgery.

Materials: Bibliographic review. Own case archive.

Results: Testicular yolk sac tumours (TYST), also known as endodermal sinus tumours, are a type of germ cell tumour. Under the WHO 2016 classification, testicular TYST are divided in prepuberal and postpuberal types. Prepuberal TYST are considered the pure form (derived from normal spermatogonia) and appear in infants and toddlers, whereas postpuberal YST are secondary to abnormally developed embryonic cells and present in adults 18 to 45. Although rare overall, prepuberal TYST has paramount importance in paediatrics as it accounts for up to 80% of testicular neoplasms in children under 3 years of age. It usually presents as a painless testicular mass in an infant or a toddler. TYST can be differentiated from other causes of testicular swelling in young children thanks to its characteristic US appearance, and diagnosis is usually confirmed with molecular and histopathological markers. Staging and imaging follow up are primarily done with MR and/or PET-CT as well as alpha-fetoprotein levels. Treatment of TYST involves orchiectomy with optional adjuvant chemotherapy. Prognosis of YST in prepuberal children is generally good, although retroperitoneal lymphatic recurrence is not rare and should be watched out for.

Conclusions: Testicular YST is relatively uncommon, but it is the number one cause of testicular cancer in children from ages 0 to 3. The pediatric radiologist should be familiar with its clinical and imaging presentation as well as its basic management.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**

**ESPR
2023****57th ANNUAL MEETING &
43rd POST GRADUATE COURSE****Chest wall lipoblastoma in a 4-year-old boy, a case report**Neda Azin¹, Mehdi Shahsavan²

1. Assistant Professor, Department of Radiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Resident, Department of Radiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Lipoblastomas are uncommon benign encapsulated tumors of embryonic white fat that mostly found in infants and young children. The extremities and the torso are the most frequent sites for tumors. Chest wall lipoblastomas are very rare and only a few cases are reported.

Case report: We present a 4-year-old boy that was evaluated for suspicion of a foreign body. However, the lipoblastoma was discovered incidentally on a computed tomography (CT) imaging. The histopathological analysis in our instance was confirm the lipoblastoma diagnosis. Then, patient was operated, and the lesion was excised completely.

Conclusion: In children, a chest wall lipoblastoma should be considered as a differential diagnosis for any pediatric thoracic tumor, despite the fact that it is extremely uncommon.

Keywords: Lipoblastoma, chest wall, thoracic mass, children.

BELGRADE, SERBIA / Crowne Plaza Hotel**05 - 09 June**