

## Lateral access surgery: a decade of innovation

Pedro Berjano<sup>1</sup> · Claudio Lamartina<sup>1</sup> · William Smith<sup>2</sup> · Max Aebi<sup>3</sup>

Received: 19 March 2015 / Revised: 19 March 2015 / Accepted: 19 March 2015 / Published online: 26 March 2015  
© Springer-Verlag Berlin Heidelberg 2015

Ten years after Ozgur's description of the transpoas anterior lumbar interbody fusion [1] (published in 2006 but submitted in 2005), this technique, considered by many a new fashion that would have soon declined and then disappeared, has gained a place in the armamentarium of spine surgeons. Over this period, a large number of procedures have been performed worldwide, different variations and technical refinements have been proposed and the procedure has been extended to a wider range of indications, now including primary and revision surgery for degenerative problems, adult deformity, corpectomy and thoracic disc herniation.

The *European Spine Journal* (ESJ) has contributed to the increase of scientific knowledge on lateral surgery with a number of relevant papers. In 2011, two articles [2, 3] provided important knowledge on the regional neural and vascular anatomy related to the transpoas approach, providing quantitative and qualitative data to better understand and control the risk of injury to the lumbar plexus. In 2012, a retrospective study [4] on the neurological safety of the procedure (one of the hottest topics related to transpoas surgery) was published in the Journal. Other papers have shown clinical results [5, 6] for early applications, such as degenerative disc disease and degenerative spondylolisthesis or stenosis.

More recently, the use of lateral access has received more attention for its application to adult scoliosis; some papers [7, 8] have been published related to the topic in the ESJ. Sagittal alignment after lateral procedures has also been a topic of interest for clinicians, as in the past years the approach was thought to be able to solve by itself the problem of hypolordosis in the lumbar spine and sagittal imbalance. This has been a subject of debate in the Journal [9, 10]. A recent systematic review of the literature [11] has finally provided data to support the argument against an overoptimistic consideration of standard lateral procedures as the solution for sagittal imbalance. The ESJ's Open Operating Theatre video series has also dedicated attention to the detailed description of lateral access surgical techniques for lumbar fusion, corpectomy and thoracic disc herniation [12–14].

That lateral access surgery has attracted much interest in the spinal community is a matter of fact. To support this affirmation, it is enough to say that one article on lateral access for adult scoliosis [15] has recently appeared in the listing of the three most cited articles of those published by *European Spine Journal* since 2013 (source Thomson Reuters) [16].

This Supplement issue places in the reader's hands a unique number of original and review articles dealing with important aspects of lateral access surgery, with large space devoted to clinical results, newer applications (such as the role of lateral access techniques for correction of sagittal imbalance, disc replacement or indirect neural decompression) and safety of the approach (with a survey on complications in a cohort of 13,000 cases and a multicenter study on the value of continuous EMG monitoring for prevention of new neurological deficit).

In addition, this Supplement issue includes a new editorial format that aims to give the reader a unique

---

✉ Pedro Berjano  
pberjano@gmail.com

<sup>1</sup> IRCCS Istituto Ortopedico Galeazzi, Milan, Italy

<sup>2</sup> Western Regional Center for Brain and Spine Surgery,  
Las Vegas, NV, USA

<sup>3</sup> “Das Rückenzentrum”, Hirslanden-Salem Hospital, Bern,  
Switzerland

learning experience. With this goal, original and review papers that present new knowledge in the field, along with two OOT Surgical Videos and six OOT Master Lectures have been combined in the issue. This material, which can be watched and listened to, will allow to cover other potential learning needs (as basic concepts on anatomy, surgical technique, surgical indications and complication avoidance) that otherwise could not be adequately presented in the form of original or review articles or case reports.

**Conflict of interest** Pedro Berjano, Claudio Lamartina and William Smith have received honorarium from Nuvasive as lecturers and as consultants. Pedro Berjano and Claudio Lamartina have received honorarium from DePuy Synthes and K2m as consultants. William Smith has received royalties from Nuvasive.

## References

- Ozgur BM, Aryan HE, Pimenta L, Taylor WR (2006) Extreme lateral interbody fusion (XLIF): a novel surgical technique for anterior lumbar interbody fusion. *Spine J* 6(4):435–443
- Hu WK, He SS, Zhang SC, Liu YB, Li M, Hou TS, Ma XL, Wang J (2011) An MRI study of psoas major and abdominal large vessels with respect to the X/DLIF approach. *Eur Spine J* 20(4):557–562
- Kepler CK, Bogner EA, Herzog RJ, Huang RC (2011) Anatomy of the psoas muscle and lumbar plexus with respect to the surgical approach for lateral transpsoas interbody fusion. *Eur Spine J* 20(4):550–556
- Pumberger M, Hughes AP, Huang RR, Sama AA, Cammisa FP, Girardi FP (2012) Neurologic deficit following lateral lumbar interbody fusion. *Eur Spine J* 21(6):1192–1199
- Berjano P, Balsano M, Buric J, Petruzzi M, Lamartina C (2012) Direct lateral access lumbar and thoracolumbar fusion: preliminary results. *Eur Spine J* 21(Suppl 1):S37–S42
- Formica M, Berjano P, Cavagnaro L, Zanirato A, Piazzolla A, Formica C (2014) Extreme lateral approach to the spine in degenerative and post traumatic lumbar diseases: selection process, results and complications. *Eur Spine J* 23(Suppl 6):684–692
- Anand N, Baron EM (2013) Minimally invasive approaches for the correction of adult spinal deformity. *Eur Spine J* 22(Suppl 2):S232–S241
- Khajavi K, Shen AY (2014) Two-year radiographic and clinical outcomes of a minimally invasive, lateral, transpsoas approach for anterior lumbar interbody fusion in the treatment of adult degenerative scoliosis. *Eur Spine J* 23(6):1215–1223
- Mattei TA (2013) Letter to the Editor concerning “Far lateral approaches (XLIF) in adult scoliosis” by P. Berjano and C. Lamartina (*Eur Spine J*. 2012 Jul 27. [Epub ahead of print]): The order of the factors does affect the product: considerations on why coronal (and not sagittal) imbalance should dictate the sequence of the ‘combined XLIF/posterior approach’ to adult degenerative scoliosis. *Eur Spine J* 22(5):1183–1185
- Berjano P, Lamartina C (2013) Answer to the letter to the editor of T.A. Mattei concerning “Far lateral approaches (XLIF) in adult scoliosis” by P. Berjano and C. Lamartina (*Eur Spine J*. 2012 Jul 27. [Epub ahead of print]). *Eur Spine J* 22(5):1186–1190
- Costanzo G, Zoccali C, Maykowski P, Walter CM, Skoch J, Baaj AA (2014) The role of minimally invasive lateral lumbar interbody fusion in sagittal balance correction and spinal deformity. *Eur Spine J* 23(Suppl 6):699–704
- Berjano P, Lamartina C (2011) Minimally invasive lateral transpsoas approach with advanced neurophysiologic monitoring for lumbar interbody fusion. *Eur Spine J* 20(9):1584–1586
- Berjano P, Damilano M, Lamartina C (2012) Sagittal alignment correction and reconstruction of lumbar post-traumatic kyphosis via MIS lateral approach. *Eur Spine J* 21(12):2718–2720
- Berjano P, Garbossa D, Damilano M, Pejrona M, Bassani R, Doria C (2014) Transthoracic lateral retropleural minimally invasive microdiscectomy for T9–T10 disc herniation. *Eur Spine J* 23(6):1376–1378
- Berjano P, Lamartina C (2013) Far lateral approaches (XLIF) in adult scoliosis. *Eur Spine J* 22(Suppl 2):S242–S253
- [http://www.springer.com/medicine/orthopedics/journal/586?utm\\_medium=newsletter&utm\\_campaign=CON23255\\_1\\_586&utm\\_source=email&wt\\_mc=email.newsletter.8.CON23255.internal\\_1\\_586](http://www.springer.com/medicine/orthopedics/journal/586?utm_medium=newsletter&utm_campaign=CON23255_1_586&utm_source=email&wt_mc=email.newsletter.8.CON23255.internal_1_586). Accessed 24 Mar 2015