Diagnosis and Management of Hip Disease

Roy K. Aaron
Editor

Diagnosis and Management of Hip Disease

Biological Bases of Clinical Care

Springer

Editor

Roy K. Aaron, MD
Department of Orthopedics
Warren Alpert Medical
School of Brown University
Providence, RI, USA

ISBN 978-3-319-19904-7 ISBN 978-3-319-19905-4 (eBook)
DOI 10.1007/978-3-319-19905-4

Library of Congress Control Number: 2015945101

Springer Cham Heidelberg New York Dordrecht London

© Springer International Publishing Switzerland 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media
(www.springer.com)

*To Judy, David, and Daniel who have
animated my life and given it its meaning*

Preface

The diagnosis and treatment of diseases of the hip have substantially advanced in recent years. While previous advances were largely due to the development of therapeutic devices and concomitant development of biocompatible materials, more recent advances have been the result of an improved understanding of the biology of the hip. In this context, biology is interpreted broadly to include kinematics, biomechanics, anatomy, and metabolism.

The title of the book conveys the importance of advances in understanding biology as the basis for contemporary diagnosis and safe, effective treatments. This volume presents important advances in pathophysiology, pathologic anatomy, and diseases of the hip on the tissue and metabolic levels. The current emphasis on medical risk reduction in hip replacement is presented in three important chapters. The social and economic contexts in which hip diseases are treated and which affect treatment choices are discussed.

I have been extremely fortunate in being instructed in my residency training and mentored in my early years of clinical fellowship and practice by individuals who not only understood the importance of the biological basis of clinical practice but also developed it in the context of musculoskeletal disease in general, and of the hip in particular. I will always be grateful to William Harris, chief of the Hip Service and my thesis advisor at the Massachusetts General Hospital and to K. Frank Austen, chair of rheumatology, and Clement Sledge, chair of orthopedics, both at the Brigham. I could not overstate the impact that Henry Mankin, chair of orthopedics at Mass. General has had on my academic, medical orientation to clinical practice. Finally, my current chairman, under whom I was also a resident, Michael Ehrlich, has had profound influences on my professional life.

These original thinkers and generous gifted teachers created new modes of thought and provided the inspiration and the guidance to understand musculoskeletal disease and treatment in biological terms. To them, I owe the privilege of working at the interface of biology and clinical care. Any misunderstandings, errors, or omissions along the way are mine alone.

Providence, RI, USA

Roy Kenneth Aaron, MD

Acknowledgments

Ms. Jennifer Racine has worked tirelessly in pursuit of excellence in text and format. The National Institute of Arthritis, Musculoskeletal and Skin Diseases, NIH, has helped to support this work through a K24 award.

Contents

1	Health Care Organization and Its Impact on Care of Diseases of the Hip	1
	Benedict U. Nwachukwu and Kevin J. Bozic	
2	Prevalence and Societal Burden of Hip Osteoarthritis	13
	Jennifer R. Racine	
3	Metabolic Syndrome, Obesity, and Osteoarthritis	27
	Charles Eaton and Roy K. Aaron	
4	Biomechanical Considerations in Arthritis of the Hip	43
	Agnes G. d’Entremont, Lawrence L. Buchan, and David R. Wilson	
5	Gait Pathomechanics in Hip Disease	71
	Kharm C. Foucher	
6	Femoroacetabular Impingement	99
	Jaron P. Sullivan, Jacqueline Munch, Eilish O’Sullivan, and Bryan T. Kelly	
7	Osteonecrosis	119
	David R. Steinberg and Marvin E. Steinberg	
8	Osteoporosis and Hip Fractures	141
	Deniz Olgun, Arianna L. Gianakos, Jonathan Jo, Libi Galmer, and Joseph M. Lane	
9	Preoperative Management of Paget’s Disease	159
	Joseph R. Tucci	
10	Metabolic Bone Disease Following Organ Transplantation	185
	Se-Min Kim, Sol Epstein, Tony Yuen, Michael Pazianas, Li Sun, Barbara Murphy, and Mone Zaidi	

11 Options for Primary Hip Arthroplasty	207
Aleksey Dvorzhinskiy and Mathias P.G. Bostrom	
12 Hip Sepsis and the Prevention of Perioperative Infections	249
Javad Parvizi and Fatih Küçükdemir	
13 Venous Thromboembolism in Total Hip Arthroplasty	273
Jay Lieberman and Jessica Bear	
Index.....	289

Contributors

Roy K. Aaron, MD Department of Orthopedics, Warren Alpert Medical School of Brown University, Providence, RI, USA

Jessica Bear, MD Department of Orthopedic Surgery, Keck Medicine of USC, University of Southern California, Los Angeles, CA, USA

Mathias P.G. Bostrom, MD Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Kevin J. Bozic, MD, MBA The University of Texas at Austin, Department of Surgery and Perioperative Care, Dell Medical School, Austin, TX, USA

Lawrence L. Buchan, BASc, MASC Biomedical Engineering Program, Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute, University of British Columbia, Vancouver, BC, Canada

Agnes G. d'Entremont, PhD Department of Mechanical Engineering, University of British Columbia, Vancouver, BC, Canada

Aleksey Dvorzhinskiy Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Charles Eaton, MD Department of Family Medicine and Epidemiology, Warren Alpert Medical School of Brown University, Providence, RI, USA

Sol Epstein, MD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA

Kharma C. Foucher, MD, PhD Department of Kinesiology and Nutrition, University of Illinois at Chicago, Chicago, IL, USA

Libi Galmer, DO Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Arianna L. Gianakos, BS Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Jonathan Jo, BS Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Bryan T. Kelly, MD Center for Hip Preservation, Hospital for Special Surgery, New York, NY, USA

Se-Min Kim, MD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA

Fatih Küçükduymaz, MD Department of Orthopedics and Traumatology, Rothman Institute at Thomas Jefferson University, Philadelphia, PA, USA

Department of Orthopedics and Traumatology, Bezmialem Vakif University, Istanbul, Turkey

Joseph M. Lane, MD Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Jay Lieberman, MD Department of Orthopedic Surgery, Keck Medicine of USC, University of Southern California, Los Angeles, CA, USA

Jacqueline Munch, MD Orthopedics and Rehabilitation, Oregon Health and Science University, Portland, OR, USA

Barbara Murphy, MD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA

Benedict U. Nwachukwu, MD, MBA Department of Academic Training, Hospital for Special Surgery, New York, NY, USA

Deniz Olgun, MD Department of Orthopedic Surgery, Hospital for Special Surgery, New York, NY, USA

Eilish O'Sullivan, PT, DPT, OCS Center for Hip Preservation, Hospital for Special Surgery, New York, NY, USA

Javad Parvizi, MD, FRCS Department of Orthopedics and Traumatology, Rothman Institute at Thomas Jefferson University and Bezmialem, Philadelphia, PA, USA

Department of Orthopedics and Traumatology, Bezmialem Vakif University, Istanbul, Turkey

Michael Pazianas, MD Department of Orthopedics, Oxford University, Oxford, UK

Jennifer R. Racine, MBA Department of Orthopedics, Warren Alpert Medical School of Brown University, Providence, RI, USA

David R. Steinberg, MD Department of Orthopedic Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

Marvin E. Steinberg, MD Department of Orthopedic Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

Jaron P. Sullivan, MD Department of Orthopedics, Vanderbilt University, Nashville, TN, USA

Li Sun, MD, PhD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA

Joseph R. Tucci, MD, FACE, FACP Department of Medicine, Roger Williams Medical Center, Providence, RI, USA

David R. Wilson, BEng, DPhil Department of Orthopedics, Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute, University of British Columbia, Vancouver, BC, Canada

Tony Yuen, PhD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA

Mone Zaidi, MD, PhD Department of Medicine, Mount Sinai School of Medicine, New York, NY, USA