

Ageing Medicine

Series Editors: Robert J. Pignolo · Mary Ann Forciea · Jerry C. Johnson

Robert J. Pignolo
Mary Ann Keenan
Nader M. Hebel *Editors*

Fractures in the Elderly

A Guide to Practical Management

 Humana Press

AGING MEDICINE

Robert J. Pignolo, MD, PhD; Mary Ann Forcica, MD;
Jerry C. Johnson, MD, Series Editors

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ISBN 978-1-60327-466-1 e-ISBN 978-1-60327-467-8
DOI 10.1007/978-1-60327-467-8
Springer New York Dordrecht Heidelberg London

© Springer Science+Business Media, LLC 2011

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Printed on acid-free paper

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Preface

According to the National Osteoporosis Foundation, one in two women and one in four men over age 50 will have an osteoporosis-related fracture in their lifetime, accounting for more than 1.5 million fractures annually. In the USA, a women's risk of hip fracture is equal to her *combined* risk of breast, uterine, and ovarian cancer. Although not all fractures in the elderly are related to osteoporosis, the vast majority of them are, and the risk of fracture from both low- and high-impact trauma is increased in the setting of osteoporosis.

Only about 40% of hip fracture survivors are able to return to their prior level of activities of daily living, and even fewer return to their prefracture level for instrumental activities. A nontrivial proportion of patients with hip fractures will require long-term institutional care. Despite these sober statistics, currently less than 15% of those with recent fragility fractures are evaluated and treated for osteoporosis, dramatically increasing the likelihood of future fractures.

This book is an acknowledgement that fractures in the elderly are common, very often multifactorial, and are best approached by the collaborative efforts of orthopaedic surgeons and specialists in geriatric medicine. Other medical disciplines, including anesthesiology, rehabilitation medicine, psychiatry, endocrinology, and rheumatology also play key roles in the care of the elderly fracture patient. Because of the potentially devastating consequences of fractures in the elderly, their presentations should be viewed as opportunities to reduce future morbidity and mortality as well as to preserve function. This book is dedicated to these goals.

The specific aims of *Fractures in the Elderly* are (1) to provide geriatricians and other medical specialists who provide care for older adults with the necessary information and most current data and opinions regarding the treatment of elderly patients who sustain a variety of fractures, and (2) to provide orthopaedic surgeons with the necessary information and most current data and opinions regarding assessment and management of geriatric conditions that predispose the elderly to fracture, perioperative complications, and subsequent functional decline. The scope of the book will encompass the etiologies of fracture in the elderly, perioperative management, the surgical treatment of common fractures in the elderly, as well as rehabilitation and prevention in the older patient.

It was the intention of the editors to have the content of each chapter be both readable and appealing to both of the two major target audiences, as well as to all disciplines that have contact with elderly patients who have sustained or are at high risk of sustaining a fracture. We hope to illustrate that although in some cases pre- and postoperative care in elderly fracture patients may proceed as it does in younger individuals, often there are considerations owing to functional status, preexisting conditions, and age-related physiological declines that require specialized knowledge and alternative approaches. This book serves to provide this specialized knowledge and approaches to care, and it is intended to be a valuable reference for clinicians as well as fellows and residents in training.

Contents

Part I The Aging of Bone and Etiologies of Fractures

1 Osteobiology of Aging	3
Andrew Rosenzweig and Robert J. Pignolo	
2 Pathologic Fractures	43
Jesse T. Torbert and Richard D. Lackman	
3 Falls	55
Amy M. Corcoran and Bruce Kinoshian	

Part II Perioperative Management

4 Preoperative Assessment of Risk	71
Joan Weinryb	
5 Anticoagulation	87
Kathleen Walsh and John Bruza	
6 Prevention and Management of Perioperative Delirium	101
Jerry C. Johnson	
7 Anesthesia and Postoperative Pain Control	115
Jonathan R. Gavrin	
8 Postoperative Complications	145
Jung-Hoon Kim	

Part III Common Fractures in the Elderly

9 Hand and Wrist Fractures in the Elderly 171
 Laura C. Wiegand, Atul F. Kamath, Nick D. Pappas,
 and David J. Bozentka

10 Fractures of the Shoulder and Elbow 187
 J. Stuart Melvin, Karen Boselli, and G. Russell Huffman

11 Vertebral Compression Fractures 225
 Ejovi Ughwanogho and Nader M. Hebel

12 Hip Fractures..... 239
 Andrew F. Kuntz, Albert O. Gee, Jaimo Ahn, and Samir Mehta

13 Fractures of the Distal Femur 257
 Jesse T. Torbert and John L. Esterhai

14 Tibial Plateau Fractures in the Elderly..... 269
 John Alan Scolaro and Gwo-Chin Lee

Part IV Rehabilitation, Post-fracture Evaluation, and Prevention

15 Rehabilitation 285
 Keith Baldwin, Derek J. Donegan, and Mary Ann Keenan

16 Evaluation of Bone Fragility and Fracture Prevention 309
 Robert J. Pignolo

Index..... 329

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Part I
The Aging of Bone and
Etiologies of Fractures

Chapter 1

Osteobiology of Aging

Andrew Rosenzweig and Robert J. Pignolo

Abstract The goals of this chapter will be to give a brief overview of bone biology, describe the molecular mechanisms of bone remodeling and pathologic uncoupling, and provide a general survey of the multiple pathways leading to aging bone and osteoporosis.

Keywords Bone • Remodeling • Osteoporosis • Osteoblast • Osteoclast • Cellular senescence

1.1 Introduction

The human skeleton is a dynamic organ that serves multiple functions including support, protection, storing metabolic building blocks, and providing insertion points for tendons and ligaments. A tightly coupled mechanism known as remodeling exists in the skeleton which allows for the constant turnover of bone, even after longitudinal growth has ceased. Osteoclasts reabsorb old bone and osteoblasts follow closely, laying down new structural units of bone. There is a complex interplay between these cells mediated by many endogenous local and systemic factors as well as exogenous mechanical stresses [1]. Peak bone mass usually occurs in the third decade of life in humans after which there is a period of relatively stable bone mass followed by progressive decline. As the body ages, the mechanism of bone remodeling becomes more dysfunctional, leading to an uncoupling of bone formation and resorption and a net loss of bone density and structural integrity, causing osteoporosis and increasing the risk of fractures.

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