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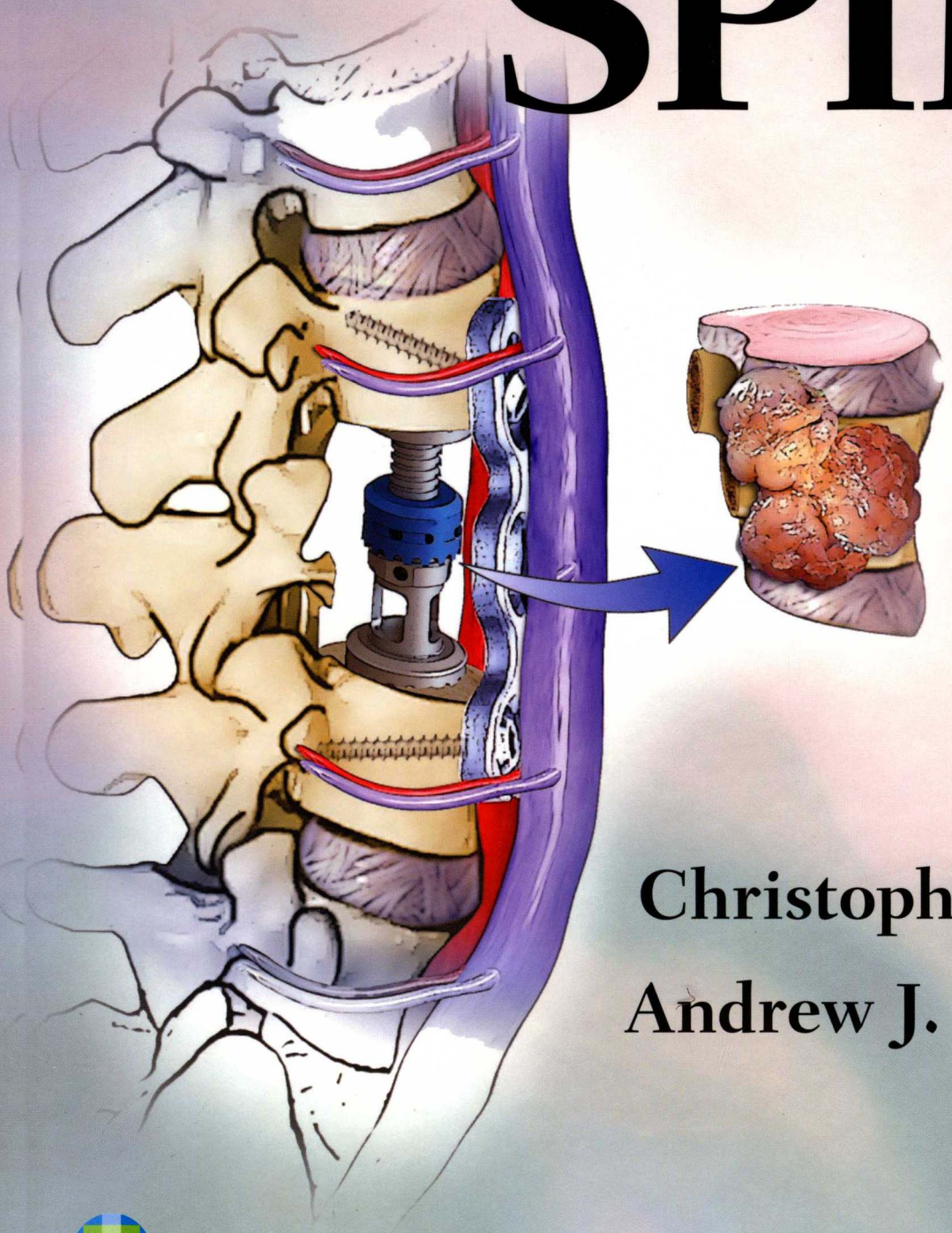

Christopher M. Bono

Andrew J. Schoenfeld

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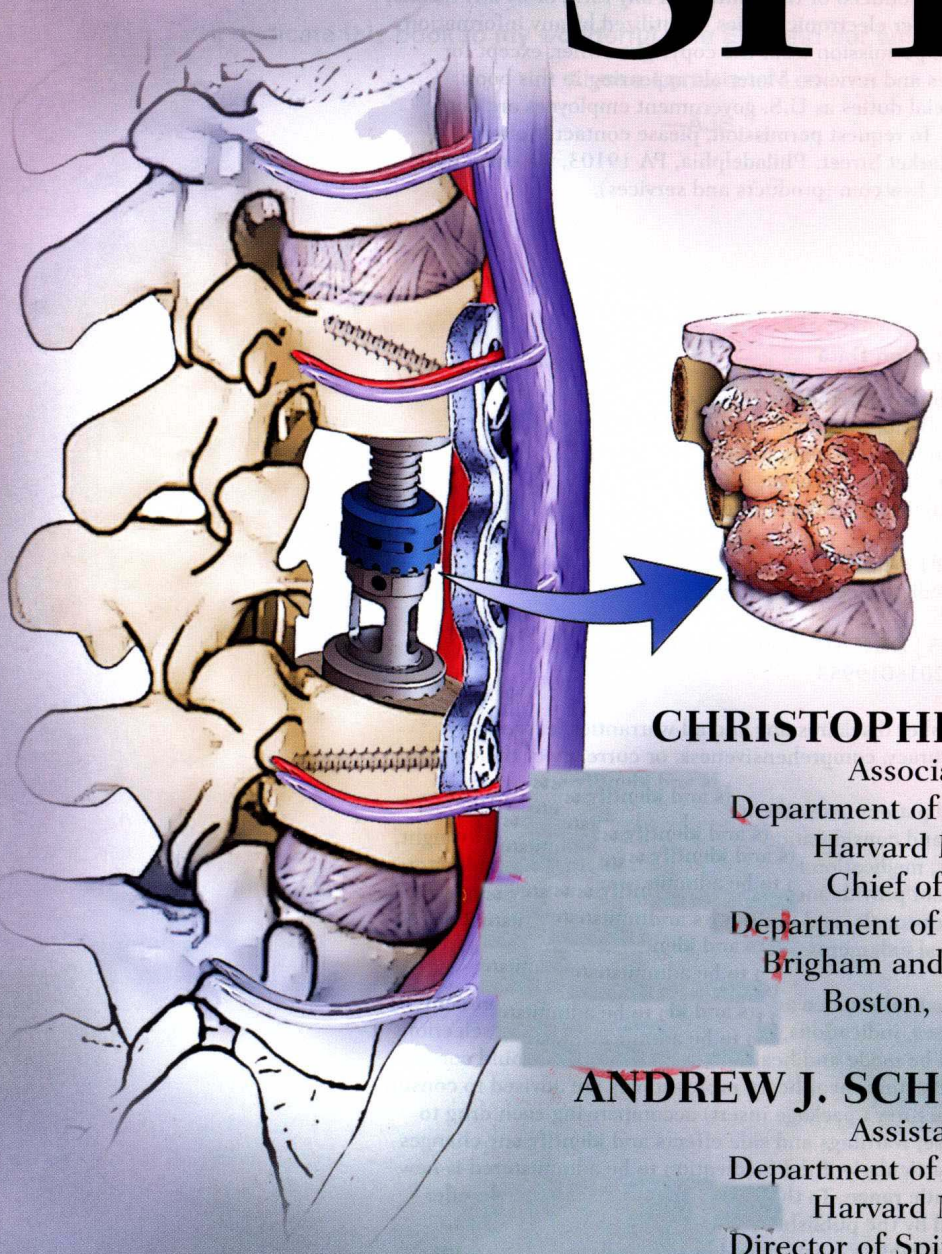

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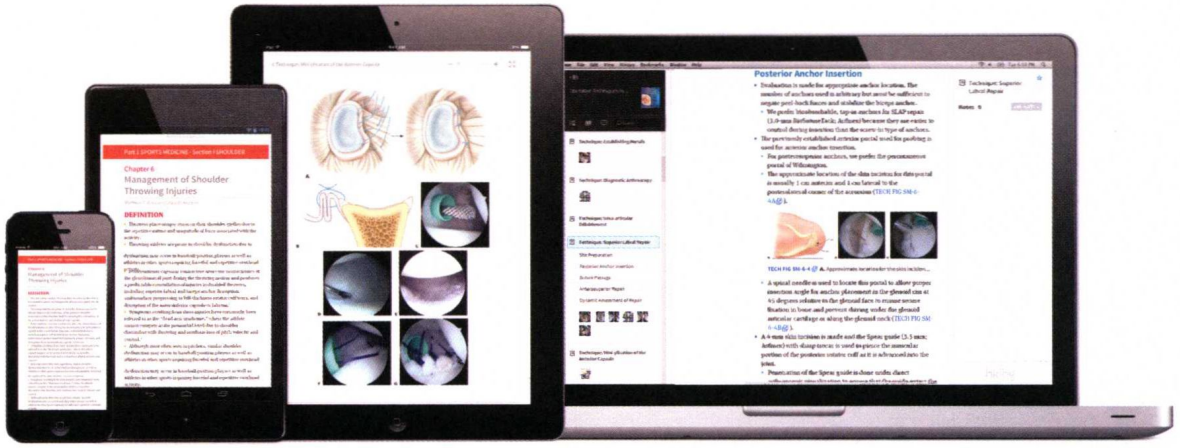

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This book is dedicated to my late father, Ernest, who instilled in me the sense that any accomplishment was achievable, exemplified the joy of satisfaction with one's life and lack of envy of anyone else's, and demonstrated that discipline and routine is the pillar of strength and achievement.

—CMB

I dedicate this book to my wonderful wife Erin and our amazing children Roman, Alyssa Lena, and Leo.

—AJS

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PREFACE

It is a rare opportunity that one has the privilege of editing a second edition of a textbook. Within this charge lies both accolade and expectation. With 12 years passing since the first edition, much has changed in the field of spinal surgery; yet, much has stayed the same. It has been our goal to offer the reader a carefully crafted balance of new and classic information. Authors have expertly composed succinct, yet complete, chapters on the wide breadth of spinal conditions. Others have diligently outlined the critical elements of examination, evaluation, and general knowledge. In distinction from other review books, it has been this work's goal to not only provide the so-called high yield information but also a practical understanding of the implementation of treatment. We are confident that you will appreciate these efforts when reading this second edition of *Orthopaedic Surgery Essentials: Spine*.

PREFACE TO THE FIRST EDITION

As the field of spinal surgery advances, it has become increasingly difficult for the orthopaedic resident to collect, let alone master, necessary and pertinent knowledge and information. Not with standing, the resident is challenged further by the interdisciplinary nature of spinal surgery, with advances in knowledge being reported in various orthopaedic subspecialty and neurosurgical journals in addition to dedicated spine publications.

In accordance with the series' mission, the editors of *Orthopaedic Surgery Essentials: Spine* have attempted to collect, compile, and distill this information into one easily accessible and user-friendly source. The chapters have been written with one goal in mind—educating the resident. The chapters have been authored by established and upcoming leaders and pioneers in spinal surgery whose challenge it was, metaphorically, to fit an encyclopedia into a briefcase. After reading their splendid work, you will realize they have superbly succeeded!

ACKNOWLEDGMENTS

The extraordinary efforts of many have enabled completion of this second edition. First, to my co-editor, former fellow, and spine partner Andrew Schoenfeld, I thank you for accompanying me on this journey. To Louise Bierig, I thank you for your wonderful management of the production of this book. Finally, I must thank my wife, Terri, and children, Alissa, Bella, and Christopher, for their understanding and acceptance that "Daddy's work" often steals hours away from them, only to be incompletely repaid with these words.

—CMB

I would like to acknowledge my wife, Erin, who patiently followed me across the United States during my pursuit of an academic career in medicine, all the while providing a loving home to return to at the end of every day. I also would like to recognize my children, Roman, Alyssa, and Leo, who enrich my life in countless ways and never cease to amaze. I would not be where I am today without the support of my parents, Patricia and David Schoenfeld, who provided first lessons and patiently took me to libraries in the beginning. Special thanks goes out to the Robert Wood Johnson Clinical Scholars Program and Center for Healthcare Outcomes and Policy at the University of Michigan and my colleagues, friends and mentors in the Department of Orthopaedic Surgery and the Center for Surgery and Public Health at Brigham and Women's Hospital and Harvard Medical School, especially Christopher Bono who graciously allowed me to be a part of this effort. I also appreciate the inspiration provided by Athanasios Diakos and Franz Josef, as well as my patients, who every day help me become a better physician, clinician, and scientist. Finally, I wish to acknowledge the sustaining strength provided to me by God, my Grandparents, Abraham and Lena Schoenfeld and Eneida and Carlos Weber, Aunt Laura Ortiz Weber, Papito, and the Andrew who is always with me.

Without you, none of this would be possible.

—AJS

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PHYSICAL EXAMINATION OF THE SPINE

DANIEL R. POSSLEY
ANDREW J. SCHOENFELD

INTRODUCTION

A thorough history and physical examination is the cornerstone to the effective evaluation of spinal disorders. While modern imaging modalities, such as computed tomography and magnetic resonance imaging, can clearly delineate pathology involving the osseous and soft tissue structures of the spine, it is the history and examination that correlates imaging findings with the patient's complaints and functional limitations. A thorough and efficient approach to history taking and focused examination of the spine are vital skills for any clinical spine specialist. The history will provide details of the patient's symptoms and perceived limitations which help modify the differential diagnosis. Effective identification of the factors responsible for pain and disability as well as those interfering with recovery, are the principal goals of the physical examination. Focused testing during the examination can further narrow the differential and, in the outpatient setting, may direct what additional imaging modalities are required. Confirmation of the diagnosis will allow for an appropriate intervention or enable the formulation of a comprehensive and personalized treatment plan.

Spine surgeons are most frequently asked to evaluate patients in the outpatient clinic or the hospital setting. In the hospital environment, evaluation may occur in the acute setting of the emergency department or in clinical consultation on the wards. The history and examination should be tailored to the clinical nuances of the location in which the surgeon is asked to evaluate a patient. For example, in the outpatient setting where patients typically present with chronic or subacute issues, a greater emphasis may be placed on provocative testing that can reproduce patient symptoms and localize or differentiate their spinal disorder. In the more acute atmosphere of the hospital, patient injuries or active comorbidities might limit what examination maneuvers can effectively be performed and the evaluation is typically geared toward screening for injuries or understanding the physical manifestation of known spinal issues. The general approach and sequence of the examination, however, remains the same regardless of the clinical setting in which the history and physical examination is conducted. This chapter presents a standardized approach to the thorough examination of patients with spinal disorders in both the outpatient clinic and hospital environment.

EXAMINATION IN THE OUTPATIENT CLINIC

Inspection

The physical examination in the outpatient setting is typically comprehensive and should regularly follow several steps. In the office setting, more emphasis may be placed on provocative tests geared toward reproducing the patient's symptoms or complaints. The overall goal is to localize the patient's issue to spinal pathology and narrow the differential diagnosis which may include axial and mechanical back pain, radiculopathy, myelopathy, fracture, or some other pathologic process.

Upon greeting the patient, observation begins with evaluation of posture, demeanor, and character. Observation of standing trunk and appendicular alignment is performed, including assessment for muscle spasm and alterations in normal cervical and lumbar lordosis as well as thoracic kyphosis (Fig. 1.1). Head, shoulder, and pelvic height and tilt is assessed as well as observation of any scars, contractures, skin changes, atrophy, and/or hypertrophy. Gait assessment can be completed as the patient enters the room or more formally as part of the examination. Specific gait patterns can represent certain neurologic disorders. Gait patterns suggestive of neurologic deficits include a stochastic gait or associated footdrop. A wide-based gait may be indicative of a myelopathic process (Table 1.1). An antalgic gait is generally associated with lower extremity pathology, but may also present within the constellation of symptoms associated with referred back pain or radicular issues.