Spinal surgery became an important part of neurosurgery even while the specialty was being developed. One of Victor Horsley’s early triumphs was the removal of a thoracic spinal cord tumor. There were no imaging studies, and clinical localization proved to be imprecise. But Horsley persisted in spite of initial negative exploration, extending the surgery to eventually find and remove the tumor. Walter Dandy recognized and removed herniated lumbar disks in the 1920s. Charles Elsberg was probably the first neurosurgeon to specialize in the spine. Mixter and Barr thoroughly described herniation of the intervertebral disk and its surgical treatment. By the 1940s operations on herniated lumbar and cervical disks via posterior approaches were widely described and discussed in the neurosurgical literature. By the 1960s the anterior approach to the cervical spine was firmly established.

Throughout the second half of the twentieth century, most neurosurgeons in the United States spent a majority of their time dealing with spinal diseases. Operations for the herniated disk, some spinal deformities, and to a lesser extent, spinal stenosis represented the majority of neurosurgical operations. Intracranial procedures were perceived as more glamorous, but spinal operations dominated the neurosurgical practice. At the same time, spine surgery in orthopedics grew in a somewhat different way with a great emphasis upon scoliosis and the repair of spinal deformity. By the 1980s the lines between orthopedic spine practice and neurosurgical spine practice had begun to blur, and by the 1990s there were few distinguishing features unique to one specialty or the other.

The introduction of the operating microscope in the 1970s revolutionized many aspects of intracranial surgery. But the microscope had no such decisive effect upon most spinal surgery. Although some surgeons utilized high magnification for spinal surgery, the majority did not. Obliteration of arterial venous malformations and removal of spinal cord tumors were both greatly enhanced by microtechniques, however, high magnification microsurgery had a much greater impact on intracranial surgery than spinal surgery.

Most spinal surgery has required large exposures with much soft tissue and bony disruption. Even so, a few surgeons began to work with limited exposures early in the development of spinal surgery. Pool introduced myeloscopy in 1938 for direct visualization of intraspinal contents. Collis demonstrated successful keyhole surgery for disk herniation through a speculum in the 1960s. The advent of better endoscopes, high resolution video-scopy, the operating microscope, and high quality perioperative imaging have set the stage for advances in minimally invasive spinal surgery.

As these procedures proliferate, there has developed a simultaneous need for an authoritative reference for both educational and clinical uses. The editors of this volume have created such a text. The offerings in this book begin with fundamental considerations of what equipment is needed and how that equipment should be deployed to greatest advantage. For most procedures, minimally invasive only speaks to the skin incision and exposure required; complex surgeries can be ac-
accomplished with these limited exposures. Concepts of spinal surgery haven’t changed with reduced exposure.

There is another area of minimally invasive surgery that is just now being developed. Vertebroplasty is a simple way to reinforce the weakened collapsed spine that is both safe and enormously successful in well selected patients. This is only a first step in percutaneous procedures. CT is already used to provide precise placement for diagnostic and therapeutic injections of all kinds. I think it will not be long before we are injecting materials to induce regrowth of cartilage, ligament, and bone. Induction of bone growth through the injection of a variety of growth factors is likely to supplant many open fusion procedures. Direct injection of specific neurolytic materials to deactivate nociceptors is feasible. It is not a serious stretch of the imagination to think that substances to reduce the bulk of ligaments, absorb bony spurs, or shrink protruding disks will become a reality. Many of the chapters in this book are on the cutting edge of such advances. At present minimally invasive surgery is valued for reducing tissue trauma and thus the risk and discomfort for patients. I predict, however, that these approaches will soon expand into regenerative techniques that sound like science fiction today.

There is another aspect of minimally invasive surgery that is very important: high quality perioperative imaging. This kind of imaging carries with it the promise of verifying the success of any given procedure at the time it is being done. Thus every patient should have the desired effect proven by imaging before they leave the interventional suite or operating room. Because at least one-third of the spine surgery failures that I see relate to failure of the original surgeon to meet the desired goals of surgery, I believe this added perioperative imaging will be an important change in practice as well.

Neuronavigation and robotics are also important aspects of this field. Robotics are particularly appropriate for spinal surgery, and I believe that the development of robots for automatic placement of fixators will be an important application in this area. Only a short time ago these minimally invasive procedures were appearing on our meeting programs as “look what I can do” oddities. In a very brief period of time they have become a standard part of the neurosurgical armamentarium and should be learned by everyone performing spine surgery. The concept of minimally invasive surgery is rapidly becoming as revolutionary a force in spinal surgery as the introduction of the operating microscope was to intracranial surgery.

The character of spinal surgery is changing. Subspecialization in the spine is now common and subspecialization in minimally invasive spine surgery will soon become common as well. As these techniques are developed, the number of diseases and abnormalities that can be treated will expand. With these techniques we can help an increasing number of patients achieve relief from the consequences of spinal deformities and disease. Because back and neck pain are among the most common complaints of patients throughout the world, the impact of expanding our armamentarium to both understand and treat them will be enormous. The editors and their authors are to be congratulated for this pioneering work that so dramatically expands the horizons of spinal surgery and equally expands our ability to help our patients.

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Preface

Spinal surgery has evolved dramatically within the last twenty years. Innovative techniques, from the use of the operating microscope to image guidance, have changed the approach to surgical problems. In addition, improved instrumentation, from odontoid screws and lateral mass screws to sacropelvic fixation, has improved the surgical management of countless patients. It is these changes that have collectively led to the advancement of spinal surgery and subsequent improved outcomes.

One of the major advancements in this arena within the last decade has been in the development of minimally invasive spinal surgery. Since its inception, progress within this area has been dramatic. From percutaneous procedures to multilevel fusions, the advancement in this field has been unparalleled.

This book summarizes the enormous progress made in every aspect of minimally invasive spinal surgery. The text is divided anatomically, starting from the occipital cervical junction and moving down to the lumbosacral region. In this journey, everything from percutaneous procedures to multilevel endoscopic thoracic fusions is reviewed. This is a yeoman’s review of minimal access surgery, surveying its history as well as the latest in technology.

This book is meant for those who specialize in minimally invasive spinal surgery. Subdivided into cervical, thoracic, and lumbar surgery, the text and images are easily referenced. From decompressive procedures to instrumentation, details of surgical techniques are outlined. In addition, indications, contraindications, and outcomes are also discussed.

Endoscopic Spine Surgery was also written for every spine surgeon. As minimal access technology has grown, its use has spread to all aspects of spine surgery. Thus, even critics will agree that every spine surgeon should understand these procedures and utilize them as part of their armamentarium.

Lastly, this text was written for the vast array of people affiliated with spinal surgery. Addressing the broader audience from those in industry to the nurses in the operating room, we hope to promote the advancement of minimal access surgery by increasing the research and development in this subspecialty. We also hope to educate all of those involved in this area, decreasing anxiety and increasing comfort level for all within the operating room.

Minimally invasive spine surgery is here to stay. Since its inception, it has led to improvements in patient care. This has been demonstrated through decreased postoperative pain and length of hospitalization with good neurological outcomes. We hope to further decrease the stigma behind endoscopic surgery by familiarizing readers with this area of specialty.

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