



Preface

When the idea for this book was conceived, we envisioned a modest monograph on prosthetic discs and nuclei. However, as we discussed the concept and reviewed the exciting advances being made in the field of spine surgery, we agreed that there were many promising technologies that merited inclusion. We therefore expanded our scope to include the broader field of emerging technologies in spine surgery. What began as a small monograph has evolved into the much more comprehensive volume that has just been published. We hope that with the creation of a more expansive publication, surgeons will have a single source of information to refer to and will be able to compare potentially overlapping techniques and technologies as they determine the best treatment for their patients.

Even though these exciting advances are changing the landscape of spine surgery, their entrance into the mainstream has been somewhat tempered by new reimbursement criteria. Evidence-based assessment approaches now dictate how patients are treated, and function to determine reimbursement policies. In fact, every major payer in the United States and many international decision-making bodies now use the principles of evidence-based medicine to judge the merits of new technology. For example, the Agency for Healthcare Research and Quality (AHRQ) proposes changing the standards by which new technologies are judged, including evaluation of their usefulness and efficacy along with cost-benefit comparisons to existing therapies. Although criticism of this new policy has prevented its implemen-

tation across the board, the AHRQ has nevertheless instituted a similar program for approving pass-through payments for high-priced new technologies. These new payment reviews are based on scientific evidence generated by clinical studies. Applications for payment for new technology will require data on cost-effectiveness and comparisons with “gold standard” therapies or they will not be eligible for reimbursement. To ensure reimbursement, physicians must develop scientific evidence that a new product or procedure is not only safe and effective but also appropriate for a specific condition. In writing this book, it was our goal to provide a solid foundation for evaluating new developments in the rapidly expanding field of spine surgery.

To help achieve this goal, we have assembled a group of contributors who are experts in the fields of orthopedic surgery and neurosurgery. Many of them are the pioneers who blazed the trails to bring us to this point in the development of new technology. Their voices represent a culmination of expertise drawn from a worldwide perspective, offering a distinct advantage for the reader. Although as editors we are well aware of the organizational challenges that a textbook with multiple authors presents, we have made every effort to avoid potential weaknesses and build on obvious strengths. Thus great care has been taken to develop consistent formats for the chapters to serve as a unifying theme.

This book is divided into four parts. Part I is devoted to basic considerations of emerging technology. Of particular note is Chapter 1, entitled “Burden of

Proof,” which discusses the major challenges in taking a product from prototype through preclinical studies, including the subsequent studies needed to obtain FDA approval, and the additional studies required for reimbursement by insurance companies. This material is the backdrop for evaluating new procedures as they progress along the arduous road toward general availability and acceptance. Part II is devoted to advances in biologic and tissue engineering. The biology of spine fusion is presented, and subsequent chapters discuss methods used to promote spine fusion, such as electrical stimulation, bone grafting, growth factors, structural allografts, and gene therapy. A chapter on spinal cord regeneration and repair discusses new innovations in stem cell research that have sparked the interest of clinicians and scientists alike. Part III presents new techniques in surgical navigation and technologies such as image guidance, electromagnetic navigation, and intraoperative use of CT scans. Frequently this technology is required to verify placement of devices and help visualize specific anatomy so that optimal outcomes can be achieved. Part IV is dedicated to the step-by-step surgical techniques that pertain to this new technology in spine surgery. Part IV is further subdivided to include sections on spinal implants and disc replacement. In each chapter the authors outline the indications for surgery and then guide the reader through the intricacies of each procedure. Numerous photographs and radiographs as well as ample boxes and tables add further detail. In addition, problems and complications along with suggestions for dealing with them are presented; results and benefits are also discussed. For devices still in clinical trials, the authors report on the testing that has been done to date and the results of these tests. An understanding of this information will aid surgeons in evaluating the benefits of new technology.

We invite our readers to compare the scientific rationale and investigation strategies employed by the innovators of each technology, holding them up to stringent standards for evaluation. It is our hope that this book will provide young and experienced surgeons alike with a balanced introduction to the techniques and products poised to revolutionize the world of spine surgery.

In Appreciation

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