

Atlas of Full-Endoscopic Spine Surgery

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Foreword

This edition is special. Professor Hofstetter's *Atlas of Full-Endoscopic Spine Surgery* is a contribution that represents the leading edge of spine surgery. Endoscopic spine surgery is incredibly attractive to both surgeons and patients because of the predictably laudable outcomes and an enviable rapid patient recovery window for a spectrum of pathology. In our surgical armamentarium, this volume's significance is far more than a mere contemporary overview of the burgeoning field of endoscopic spine surgery.

This 26-chapter compendium is written with a remarkable surgical flair. It is thorough, comprehensible, and efficient. It is a step-by-step, concise description written for a broad range of learners, from those fully trained to those still part of the training phase. It is shaped by renowned surgeons who have helped push this evolving endoscopic spine field forward. Most of the chapters are penned by the editor who has an intuitive ability to communicate the most challenging surgical aspects of each operation to even a novice surgeon.

The photographs, drawings, figures, and writing style of this atlas are exceptional in nature, as there is not a single wasted stroke, figure, or chapter. The authors thought of everything from radiation safety to perioperative care. Especially, the surgical techniques chapters, which are simply a cut above many other spine atlas offerings. The atlas offers pearls, practical surgical considerations, and brilliant illustrations of how to deliver an endoscopic surgical solution.

The descriptions are almost mathematical in their emphasis on trajectories, three-dimensional anatomical perspective, and essential psychomotor nuances. The

author meticulously describes everything from the position of the surgeon's hands to the anatomical landmarks, as viewed through the endoscope. This is accomplished with the help of beautiful, crystal-clear endoscopic photographs coupled with perfectly choreographed perspectives of the patient/surgeon interface.

Each chapter of this all-encompassing atlas has been crafted intelligently and logically to successfully guide the surgeon through an endoscopic spine procedure. In essence, the atlas is framed in a style that reflects how we, as surgeons, think, analyze, and execute a surgical plan when treating patients with spine conditions. Professor Hofstetter's atlas helps elevate the subject matter to the impeccable technical standards of other classic, academic brain and spine surgery-related subject matter. In addition, the book incorporates the AO nomenclature that will be the basis for the AO worldwide teaching curriculum. Finally, it will likely standardize endoscopic techniques to allow surgeons to compare their results, as this field grows exponentially.

This is a "must have" book for surgeons who are committed to mastering this important and evolving endoscopic spine technique in order to improve their patients' outcomes.

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Foreword

It is with great pleasure that I accept the invitation to write a foreword to Professor Hofstetter's wonderfully organized and executed *Atlas of Full-Endoscopic Spine Surgery*. As surgeons dedicated to the careful diagnosis and treatment of spinal pathology, our ultimate goal is to deliver the highest quality of care in order to achieve the best possible outcomes for our patients.

Unquestionably, the evolution of spinal surgery has rapidly progressed in recent decades.

As a consequence, we as surgeons, are constantly exposed to new technologies and have to ask ourselves difficult questions that sometimes do not have clear answers:

- Is this new technology really going to improve my ability to take care of patients?
- Is this here to stay or is this just a temporary trend that will fail to deliver the results promised and ultimately fade?
- Was this technology born out of a true surgical need or is it pushed for other reasons, such as industry-interest or by surgeons' egos?
- Finally, am I at a stage in my career where I can/should invest time and resources in learning this skill, and if so, how can I best do this without compromising patient safety and care?

These are certainly the questions I ask myself as I wander through the halls of our many meetings or peruse the spinal journals that land on my desk on a daily basis. I marvel at the display of technical gadgets from navigation and robotic technology, the wonders of biological disc regeneration, minimally invasive surgery, and the latest implant designs that promise higher fusion rates or faster patient recovery. Fortunately, Professor Hofstetter and co-authors finally give us some clear guidance in the area of spinal endoscopy.

Spinal endoscopy, which has transformed in recent years, certainly falls into the category of techniques that fascinate but also intimidate us spine surgeons: Did you ever find yourself watching a video clip of endoscopic spinal surgery at a meeting, or glance at articles and manuscripts describing endoscopic procedures and feeling completely lost, confused, and wondering if your understanding of the spinal anatomy is just not sophisticated enough to follow along? Do you get irritated when you overhear surgeons

using many different (usually company coined) terms describing a particular surgery and it turns out they are all referring to the same procedure?

Well, this book will help you understand! It hits exactly the right spot; it is short, concise, and comprehensively written in understandable language. It is edited and written by experts in the field who went through a learning curve that we as spine surgeons who were trained in open or more "traditional" MIS surgery (mainly tubular or specular) can understand and potentially replicate. Professor Hofstetter picked up endoscopy as a natural extension after he understood and mastered "tubology." He came from where most of us are right now. And this is exactly where the strength of this book is.

Did you wonder how endoscopic surgeons create a working space in a tight spinal canal in the presence of severe stenosis? Go to Chapter 9.1 and you find a detailed description that is practical, easy to understand, and well-illustrated! One of the most satisfying procedures in my practice is the unilateral tubular approach for bilateral decompression for lumbar spinal stenosis. Chapter 14 shows a clear and understandable pathway for achieving similar decompression via the endoscope. The "Pearls and Pitfalls" that are integrated into most chapters are my favorites and provide valuable advice.

In short, this is a book that we were looking for. It is time to accept that endoscopic surgery is here to stay and will eventually replace and/or enhance many procedures that we do as open or "traditional" MIS surgeries in our daily practice. There is no doubt that spinal endoscopy will help us come closer to our ultimate goal of delivering the highest possible quality of care and achieving the best possible outcomes for our patients.

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Preface

Recent advances in spine surgery have been nothing short of breathtaking. Full-endoscopic spine surgery is an emerging technique which has had a dramatic impact on the worldwide practice of spine surgery. Despite the rapid evolution of endoscopic spine surgery in past few years, there has been a relative lack of consistency in nomenclature, operative technique, and surgical goals within the global spine community. The resulting differences have stymied true academic discussion on the role full-endoscopic spine surgery plays in the treatment of spinal pathology.

This book is intended to describe the standard surgical technique of full-endoscopic spine surgery and its nuances to residents, fellows, and spine surgeons, who are interested in performing these procedures. This book is designed in the form of an atlas but also serves as a textbook. We consider this layout ideal, since the spine surgeon learns relevant anatomy and endoscope-specific technical vignettes by studying the images. This book also provides insights into the appropriate indications and surgical techniques in a step-by-step fashion, including special cases and strategies to manage intraoperative complications.

The book is organized into the following three sections: basic tenets, step-by-step description of common approaches, and special cases and challenges. Critical surgical concepts required to carry out full-endoscopic spine surgery are discussed in a detailed manner.

The first section highlights relevant spinal anatomy that is needed to efficiently and safely perform full-endoscopic spine surgery. In addition, this section contains a detailed description of endoscopic technology and provides information about special instruments that are used in endoscopic spine surgery. Finally, we include a description of common endoscopic tasks which greatly enhance and promote teaching of these surgical techniques.

The second section describes full-endoscopic spine procedures in a step-by-step fashion and sheds light on the common mistakes and pitfalls to avoid.

In contrast to traditional open spine surgery, the dynamic and small visual field of endoscopic spine surgery requires the spine surgeon to be vigilant regarding small details to help provide full orientation to locational anatomy. A critical element of endoscopic spine surgery is the precision of the approach; the surgeon is required to marry preoperative planning, intraoperative imaging, and controlled dissection to quickly dock onto a well-defined anatomic area. A major part of the learning curve involves mastering this transition. We therefore identified optimal *target areas* for all endoscopic procedures. The target areas are easily discernable on fluoroscopic imaging, have unam-

biguous tactile properties, and allow for quick transition to visualization once the endoscope is in place. Importantly, the target areas have anatomical features, making them identifiable within the very limited field of view provided by endoscopic spine surgery. This is necessary since full-endoscopic spine surgery does not afford the luxury of exposing multiple anatomical structures that can be utilized in concert, as is the case during traditional spine surgery. The step-by-step description has been developed during the extensive teaching experience of the editors. This section also introduces the classical surgical concept of *principal anatomical landmarks* to full-endoscopic spine surgery. Principal anatomical landmarks are highly reliable bony landmarks that allow for safe identification of neural structures. If utilized appropriately, they also allow for visual confirmation of complete neural decompression upon completion of full-endoscopic spine procedures, which has long been a major criticism of these procedures.

The third section describes the common modifications required and special tasks performed to manage special cases or complications, including dural lacerations or intraoperative bleeding.

The mission of this book is to provide a framework of the endoscopic surgical technique and also help contextualize the role of full-endoscopic spine surgery in the treatment of spinal pathology. We utilize the recently introduced worldwide AOSpine nomenclature, and a similar step-by-step curriculum of these procedures will be utilized in practical courses. Eventually, standardization will allow for more productive exchanges of ideas, further evolution of surgical techniques, and will hopefully lay the groundwork for a combined effort to better investigate patient outcomes following these procedures.

We believe that full-endoscopic spine surgery will prove to be a great asset in the light of current clinical challenges, including an aging patient population, increased medical comorbidities, and elevated expectations regarding post-operative pain and recovery. However, while we strongly believe that full-endoscopic spine surgery constitutes a crucial part of the armamentarium for the complex spine surgeon, it cannot replace traditional spine surgery. Severe spinal deformity, mechanical instability, and trauma have well established surgical remedies which cannot, currently, be replaced by full-endoscopic spine surgery. While we expect the borders between traditional, minimally invasive, and full-endoscopic techniques to be in flux, a complex spine surgeon should have insight into all of these procedures in order to choose the most sensitive option for a given pathology in each individual patient. It is paramount

Preface

for the global spine surgery community to participate in an academic dialogue to elucidate the proper indications for full-endoscopic spine surgery.

Following the framework of this book and the structured step-by-step instructions will therefore necessarily be a great asset to any spine surgeon who wishes to leverage technological advancements to elevate the quality of care they provide to their patients. We have witnessed an unprecedented enthusiasm among many spine surgeons, both novice and seasoned, once they experienced the

impact that this novel technology has on patient care. We hope that this book will serve as a foundation to establish, develop, and teach full-endoscopic spine surgery to the next generation of spine surgeons.

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