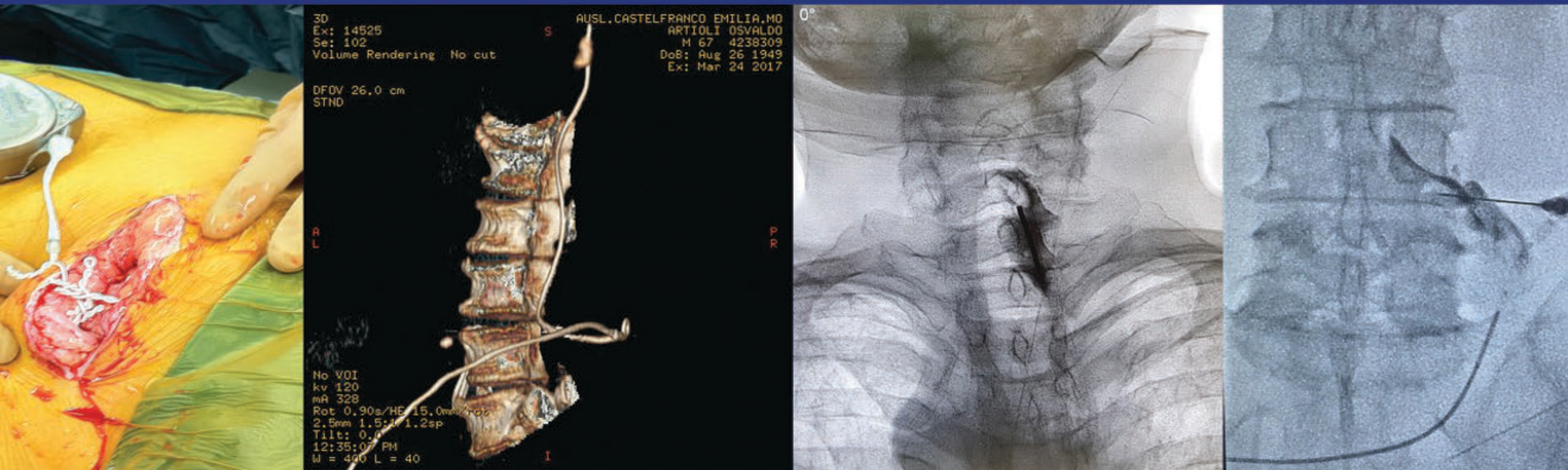
Complications of Pain-Relieving Procedures

An Illustrated Guide



Edited by: Serdar Erdine ▪ Peter S. Staats

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We would like to dedicate this book to Professor Prithvi Raj, the founding father of World Institute of Pain,a friend, an innovator, a mentor to us all. The memory of Dr Raj continues to inspire us to improve our care of patients suffering with chronic pain.

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Foreword

There have been many pioneers in interventional pain and during my tenure I was welcomed into a Texas family of Anesthesiologists and Interventional Pain Physicians fairly rapidly. I was invited by Dr. Pepper Jenkins to visit the University of Texas Southwestern Medical Center as a visiting professor. There, I met Prithvi Raj. We became lifelong friends and he mentioned that he was writing an extensive book on interventional pain procedures. I encouraged him and told him that it was a great idea. Our friendship remained throughout the years, and we kept in contact during his multiple moves. I always felt that somehow, we would work together one day. I caught up with him on his last move and encouraged him to join me at Texas Tech in the Anesthesiology department. Prithvi remained productive and a vital part of interventional pain. His vision of a Texas Pain Society (TPS) and a World Institute of Pain (WIP) became a reality. Together, with the involvement of the WIP founders David Niv, Serdar Erdine, Ricardo Ruiz Lopez and myself, we also had to make major decisions on the educational process of future practitioners. He authored numerous papers and books; always striving to be safer and better. This book is dedicated to Prithvi Raj for his first-class way of achieving so much in very fine organizations; let it be the example for others.

The contents and distribution of topics in this book has been very well written by the editors. Understanding the various complications, and learning from them, not only makes a better skilled clinician, but protects you from potential lawsuits where you may only be protected by a competent lawyer. It becomes expensive. Thou shalt not have bad outcomes and complications because of ignorance!

During my experience with between 350–400 medical legal cases, I came to recognize that we should continue to learn; one man's experience is not enough. When I was a resident in anesthesia, the incidence of mortality were 1 in 10 700. And look at the tremendous impact that came from monitoring the delivery of oxygen, CO_2, alarms, safer medications etc., every one of them becomes relevant to lower the morbidity. Look at the first large-scale study on radiofrequency procedures of the Gasserian ganglions with a remarkably high success rate, yet the first 7000 patients' outcomes reported two deaths and multiple hemorrhages from the use of sharp needle tips. Looking at the literature, there has not been any reports of blunt needles penetrating nerves or arteries. Scanlon, in his national survey of complications following transforaminal cervical injections, stated that the proposed way to reduce morbidity and mortality "is to **'use blunt needles'".**

The frequency of post-procedural disasters tends to occur on Fridays with the complications surfacing hours or days later. In particular, on Fridays followed by National Holidays. Slow bleeds have resulted in paralysis in combination with obstructed neural foramina. The incidence of huge problems can be rare and communication over weekends with any system brings in lower quality medical providers. These providers may not be at all familiar with increased pressure, loculation and hyper osmolar solutions

that may draw additional fluid volume. What about rescheduling any other day than a Friday…?

You are only getting better the more you remain current in relevant publications. One's man's experience is no experience. Bad outcomes from pain procedures should be taken more seriously and long-lasting pain relief should be recognized.

Gabor B. Racz, MD, ABIPP, FIPP
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Founder and Past President of Texas Pain Society
Founder and Past President of World Institute of Pain

Foreword

Ever since its inception in 1993 The World Institute of Pain (WIP) has defined and included into its Bylaws the education, training and certification of Pain Interventionalists as a main goal according to the Latin original text: "to help, or at least do no harm "Every therapy in the physician´s or surgeon´s skills is double-edged as every remedy is potentially harmful.

From the initial reference of August Bier in 1889, many distinguished colleagues like John Bonica, Prithvi Raj, Philip Bromage and Sampson Lipton improved Regional Anesthesia and Pain Management, pioneering a broad array of invasive techniques for the effective alleviation of pain, all constituents for the implementation of a well-established "corpus of knowledge" as a new Surgical Medical Specialty; Interventional Pain Management.

Especially in the last decades, the introduction of Gate Control Theory in the pain field by Ronald Melzack and Patrick Wall led to the initial attempts providing electrical stimulation to the spinal cord and paved the way to a tremendous evolving technology with multiple clinical applications called as Neuromodulation which are promising in the future as well.

The discovery of opioid receptors provided and built on the basis for infusional intrathecal therapies. Despite the long way and efforts carried out there is still much to be discovered in the setting up of clear boundaries for these therapies and their applications.

The application of neuroablation, first using controlled a substitute of chemical agents such as alcohol and phenon, then of radiofrequency thermocoagulation since the 1960s has made it possible to use and the wide expansion of this technology covering all areas of human body. The discovery of pulsed radiofrequency (PRF) by Menno Sluijter in 1998 introduced a new tool for neurostimulation to pain practitioners and surgeons, avoiding deafferentation pain as it could occurs with conventional – thermal – uses of conventional radiofrequency.

Special mention is deserved here of the introduction during the last two decades of vertebral augmentation, endoscopic transforaminal therapies for disc excision and various techniques of tissue removal from the spinal canal by means of the epiduroscopy, initiated by Heavner, or without direct vision, including the lysis of adhesions by Gabor Racz, as well as recent percutaneous technologies that a modern Interventional Pain Specialist should master for completion of an updated chronic pain practice.

Notwithstanding recent innovations to perform spinal surgical procedures such as percutaneous lumbar extraforaminotomy (PLEF) percutaneous spinal fusions, spinal endoscopic procedures and interspinous spacers for treating spinal stenosis, all of them define the new field of Minimally Invasive Spine Surgery (MISS), some concerns must be raised about the potential dangers to patient care.

This means there is momentum for continuous education and training on surgical complications for the experienced Pain Specialist practicing spine interventional therapies, fostering education of core competencies on failures, complications, successes and ongoing treatments, including the role of the Pain Interventionists in a multidisciplinary team integrated by other specialties including Spine Surgery and Neurosurgery.

In addition, the new field of Regenerative Medicine using plasmatic biologic agents and mesenchymal stem cell therapies is providing new tools to the Interventional Pain Specialist in order to regain effectiveness in the alleviation of pain from various degenerative disorders arising in different origins whether osteoarticular, muscular or vertebral.

There are many examples of complications, mostly through legal cases, though relatively few have been collected in the literature. The Pain Specialist must keep in mind that warning signs may differ in individual patients and, therefore, should be trained to recognize abnormal imaging for quick recognition. These skills require appropriate training in radiographic or ultrasonography anatomy in order to clearly distinguish the well-known and the unexpected or aberration imaging.

It must be highlighted that well-established protocols have not been followed or correct techniques have not been used in all the known cases of complications. Therefore, it is essential to pay attention to detail by the Specialist to avoid complications.

The initiative from Serdar Erdine and Peter S. Staats compiling this *Book of Complications in Interventional Pain Therapy* fills an important gap in the methodological study of the modern Interventional Pain Specialists which is called to be a seminal publication and useful tool in the Education and training of the future fellows. Thus, the Editors, co-Editors, and all contributing authors deserve warmest recognition from our community and sincere gratitude for having updated, with excellence, this important pending compilation of the most difficult area that nowadays Interventional Specialists must face in their clinical practices.

Ricardo Ruiz – Lopez, MD, Neurosurgery, FIPP
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Preface

"If you can't stand the heat, get out of the kitchen".

This was the advice given to (PS) early in my career by a neurosurgeon and close friend when starting the pain division at Johns Hopkins. I was first anesthesiologist at Johns Hopkins University to have surgical privileges and was of course concerned about complications. Would I know what to do if the patient had an acute bleed in the spine? Would I be able to manage an infection? These were among the concerns I had as I decided to embark on this journey to improve pain care worldwide. I did not have internal champions from my specialty that I could turn to if I got into trouble. Would I know what to do? To whom could I turn? There were no texts devoted to complications in Pain Management. No academic anesthesiologist had been granted surgical privileges and thus consideration of complications was deferred to the surgeons and was not a broad concern in our field.

Similarly, when SE became an associate professor at the age of 31, I had to develop a pain program or department, and of course grapple with complications on a systemic level. Being able to perform a procedure was not enough. We had to do it safely. It was clear that the management of complications needed to be given the same thoughtful and comprehensive approach as we did in OR anesthesia. I started the Department of Algology in the Medical Faculty of Istanbul with this vision in mind, (John Bonica liked the word Algology, which was why we chose it instead of Pain Medicine) in part to achieve this goal. Many years later, Algology became a unique subspecialty in Turkey. Years ahead of many of our peer countries.

It is now commonplace, and in fact standard, for Physical Therapy and Rehabilitation Anesthesiologists and Neurosurgeons to perform a wide range of interventional pain procedures that cross traditional barriers or specialties. However, the background and training of these specialties are quite different. Some have years of surgical training, while others have not cauterized tissue since medical school. In addition, our field is unique in the gross number of procedures an average pain physician performs. Unlike in other surgical specialties, where only a few procedures are performed on a limited area of the body, IPM, physicians are now performing literally hundreds of different types of procedures throughout the body, each requiring a deep fund of knowledge. These procedures vary greatly and may include injection of cement, use of biological agents such as stem cells, implanting devices for modulation of pain, ablation of nerves, or injections into highly complicated areas of the body. The knowledge of anatomy, physiology and surgical techniques is unparalleled when compared to other disciplines in medicine. Without this knowledge, and discipline in providing a safe environment for our patients, the rate of complications would be unacceptable.

There is consensus in the pain management community that practice of pain management has now become a specialty on its own and requires careful nurturing of its growth, specialist training of pain physicians and the creation of acceptable standards of practice guidelines for all physicians. As part of the growth of the specialty there is a recognition that complications certainly do occur, and we need a comprehensive approach to address this problem.

Development of our field came from a recognition that pain is undertreated worldwide, a universal recognition that opioids are not the answer for all patients, and that large and complex spinal

procedures are limited in their applicability. Many patients require a more nuanced approach, with understanding of their diagnosis, the range of options that exist, and careful weighing of the risks and benefits of a variety of approaches including invasive approaches which are highlighted here. Hundreds of new approaches to managing chronic pain have developed over the years. Over the past 30 years, we have developed minimally invasive approaches that are currently replacing more conventional approaches to managing complex pain. A whole new discipline of interventional pain management has been born to foster these minimally invasive approaches, while improving the care of patients. IPM doctors now cross train and must understand radiology, rehabilitation medicine, neurosurgical and orthopedic approaches, as well as anesthetic techniques as foundational while we invent new strategies to managing pain. There have been scores if not hundreds of books on the science and techniques of interventional pain management, but few have concentrated on the risks and how to avoid them. As this field has developed, we replace many more invasive procedures, with minimally invasive approaches.

If a surgeon performs only a few procedures, they become proficient quickly, practicing the same procedure over and over. From peripheral occipital nerve stimulation to regenerative medicine approaches requiring the use of ultrasound. This inherently means that the physician needs to be familiar with a wide range of approaches, normal and abnormal anatomy and, of course, the surgical implications and complications of each. So, with this advancing breadth of training required have we expanded the fellowship and training programs? Are medication strategies safer? In a word, no.

Over the past several years, as the number of interventional procedures for pain management have increased, so has the number and type of complications that occur. When we entered the field of pain medicine, there were few therapeutic strategies available to the pain physician, and patients suffered in silence, or underwent far more invasive and much less effective strategies than we have to date. In fact, the field of pain medicine was in such a state of infancy that randomized controlled trials (RCTs), and long-term follow up was considered rare. As the field has expanded in terms of the breadth of what pain physicians offer, the complexity of therapies and frank number of procedures offered, so has the rate of complications increased. The length of training has not expanded, making the rate of knowledge acquisition far quicker than was expected a mere 20 years ago.

Several textbooks cover the techniques, indications, contraindications and mechanisms of action for interventional pain management techniques, but only a few textbooks have focused on the complications, how to avoid them, their impact on patients and the psychology of the treating team, as well as any medicolegal consequences. The combination of interventional pain physicians with quite diverse training backgrounds and the recent significant increase in the use of interventional diagnostic and therapeutic techniques raises the potential for increased complications. Unfortunately, there are major limitations in the analysis of complications. This text intends to provide pearls and strategies to avoid complications, as well as strategies on how to treat them and avoid long-term injury.

As part of our Hippocratic oath, we want to help those, but “do no harm. Having proper technique, a thorough understanding of the normal and abnormal anatomy, patient co-morbid disorders, recognizing the complications that inevitably will occur early, and managing them aggressively will lead to improved outcomes.

We have both been blessed to have the opportunities to open the doors of the proverbial kitchen, made some fabulous meals (and we have helped a lot of people along the way) but we unfortunately recognize that complications do occur. Creation of this text was a work of passion, intending to improve safety of all patients across the globe. We are grateful to the worldwide experts who have devoted their time expertise and efforts in helping us all understand that while complications do occur, the risks can be mitigated, and adverse events can be treated

Serdar Erdine
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Section 1

Basic Principles