Preface

This book, *The Principles and Practice of Anesthesia for Thoracic Surgery*, is designed to be a comprehensive and up-to-date reference text for all aspects of anesthesia related to noncardiac intrathoracic diagnostic and therapeutic procedures. The goal of this text is to improve the perioperative care of thoracic surgical patients. It is written for practitioners of thoracic anesthesia at all levels: Residents, Fellows, Staff Anesthesiologists, Nurse Anesthetists, Nurse Practitioners, Anesthesia Assistants, and Allied Health Professionals who are involved in managing these patients.

The spectrum of patients who require anesthesia for thoracic procedures continues to evolve. At the beginning of the last century, thoracic surgery was mainly performed for infectious diseases and their complications such as empyema, bronchiectasis, and broncho-pleural fistula. This continues to be the mainstay of thoracic anesthesia in many developing countries as described by Dr. Rebecca Jacob of Bengaluru, India, in Chap. 33. Occasionally, patients with these types of pathology present for surgery in hospitals in the developed world also, so the principles of lung separation and isolation for these cases remain fundamental building blocks of thoracic anesthesia.

By the middle of the last century, the spectrum of thoracic surgery had shifted so that the majority of patients are now patients with malignancies, particularly lung cancer. As the population changes so have the surgical procedures; from pneumonectomy and lobectomy to lung-sparing procedures such as segmentectomy. And the surgical techniques have evolved from open thoracotomies to minimally invasive video-assisted thoracic surgery (VATS). This has allowed thoracic surgeons and chest physicians to expand the envelope of patients considered operable and to offer potentially curative pulmonary resections to patients with increasingly severe comorbidities. This in turn has placed a greater emphasis on the need for anesthesiologists to manage one-lung ventilation in complicated patients. VATS, and now Robotic, procedures have expanded to include esophageal, vertebral, cardiac, and other types of intrathoracic surgery. Practitioners who work in centers that do not perform lung surgery may now be required to provide anesthesia for VATS procedures.

The beginning of this century heralds the evolution of procedures for end-stage lung disease. Lung transplantation, lung volume reduction, whole-lung lavage, and pulmonary thromboendarterectomy are all examples of this new spectrum of operations for patients who require safe perioperative anesthetic care. Attendant with this expansion of surgery are new techniques and tools that the anesthesiologist must be familiar with such as transesophageal echocardiography, interventional lung assist devices, ex vivo lung perfusion, alternatives for postoperative analgesia, and lung isolation in patients with difficult airways. All of these are described in this text.

All of the clinical chapters in this text have been organized with a Clinical Case Discussion at the end. The purpose of these cases is to review the material presented in the preceding chapter and then to allow the reader to compare his/her solution to the clinical problem with that of the chapter authors. This should allow the reader to reflect on what has been discussed in the text and to get an impression of how the presented material can be applied in a clinical context.

This text begins, at the beginning, with the History of Thoracic Anesthesia in Chap. 1. This excellent and insightful introduction is written by Ian Conacher of Newcastle, England who has recently retired but has been a leading authority on thoracic anesthesia in Britain for the past several decades.

Next is a section on Preoperative Evaluation which details the basics of preoperative assessment focused on patients presenting for thoracic surgery, specifically pulmonary resection.
I am grateful to Gail Darling, Professor of Thoracic Surgery at the University of Toronto, for her help with this chapter. And also a chapter on Thoracic Imaging by Javier Campos and Kalpaj Parekh of the University of Iowa. Javier is a world expert on lung isolation and his use of 3-D CT scans to predict difficult placement of double-lumen tubes and bronchial blockers highlights how important it is for the clinician practicing thoracic anesthesia to examine and understand the patient’s chest imaging prior to surgery. This is one of four excellent chapters he has contributed to this text.

The next major section deals with issues of anatomy, physiology, pharmacology, and perioperative lung injury common to essentially all thoracic patients. Respiratory physiology is vitally important, fascinating, and puzzling to most anesthesiologists and in no context does this apply more than during one-lung anesthesia. Drs. Jaeger, Blank, Lohser, and Ishikawa have synthesized the recent advances in our understanding of this complex area and present it in a fashion that allows for clinical application. This is one of several chapters with contributions from Randy Blank who has been a part of this project from the very first concept and has also helped immensely by recruiting several of his colleagues from the outstanding Anesthesiology Department at the University of Virginia to contribute chapters. Similarly, this book has major excellent contributions from Jens Lohser and the very progressive Thoracic Anesthesia group at the Vancouver General Hospital. Recent research on the active contributions of the pulmonary system to metabolism and pharmacologic modifications of respiratory airway and vascular responses are detailed in Chaps. 7–9 by Drs. Littlewood, Wojciechowski, Hurford, Reimer, and Granton. Dr. Granton is head of the Pulmonary Hypertension program at the University of Toronto and a world authority in the area. Chapter 10 deals with perioperative lung injury which is becoming the major cause of mortality after major pulmonary resections.

The next section, Chaps. 11–13, of the text is devoted to anesthetic management of surgical procedures on the airways. Foreign bodies, the use of lasers in the airway and tracheal resections are anxiety provoking for all involved. Endo-bronchial ultrasound is a recent diagnostic technique that may replace mediastinoscopy for some patients. These chapters offer an organized approach to managing these difficult problems. I am indebted to Ron Purugganan (Chap. 12) for his contribution on current intravenous anesthetic techniques for managing these airway cases. This is one of two chapters (also Chap. 19 on Monitoring by Gabriel Mena) from the very busy Thoracic Anesthesia group at the MD Anderson Cancer Center in Houston.

The next section, Chaps. 14 and 15, covers Mediastinal procedures including mediastinoscopy, resection of mediastinal masses, thymic disorders (specifically myasthenia gravis), and paraaendocrine disorders related to lung malignancies. Mediastinal masses and myasthenia are always stressful for the anesthesiologist and I am grateful to Min Ku (Singapore) and Liza Chelico (Toronto) for their organized approaches to these difficult topics.

The next section, Chaps. 16–23, deals with Anesthetic Management of common intrathoracic procedures. Lung Isolation (Chap. 16) and the specific problem of Lung Isolation in Patients with Difficult Airways (Chap. 17) are thoroughly presented with excellent illustrations. Chapter 18 presents a detailed approach to preventing neurologic injuries during thoracic surgery. Chapters 19 and 20 deal with advances in monitoring. Chapter 20 specifically deals with the increased applications of transesophageal echocardiography during thoracic surgery. I am very grateful to my colleagues in the Anesthesia Department of the University of Toronto and the Toronto General Hospital: Max Meineri (Chap. 20), Karen McRae (Chap. 13), Martin Ma (Chap. 24), and Marcin Wąsowicz (Chap. 32) without whose contributions and support this text would not have been possible. Chapter 21 by Denham Ward provides a detailed review of intraoperative ventilation management in the context of Thoracic Surgery. Chapter 22 by Drs. Ochroch et al. presents a unique and useful systems approach to management of major pulmonary resections. Chapter 23 by Edmond Cohen, the Director of Thoracic Anesthesia at Mt. Sinai Hospital NY, discusses anesthetic management for the ever-increasing spectrum of VATS procedures.

The next section, Chaps. 24–26, deals with anesthesia for thoracic procedures in patients with significant comorbidities or in the elderly. Increasingly, the thoracic surgical population has patients with advanced age or morbid obesity. Drs. Castillo, Port and Heerdt (Chap. 25), and Brodsky (Chap. 26) are acknowledged experts in these areas.
Chapters 27–32 deal with uncommon and complex thoracic surgical procedures such as extrapleural pneumonectomy, combined pulmonary/vertebral resections, esophageal resections, robotic surgery, and combined cardiac and pulmonary surgery. In Chap. 28, Ju-Mei Ng summarizes the large clinical experience of the Brigham and Women’s Hospital, Boston, with extrapleural pneumonectomy. Chapter 29 by Drs. Kaufman, Amar, and Rusch is one of two excellent chapters (also Chap. 44 by Drs. Amar and Pedoto) by the very active Thoracic Anesthesia and Surgery Departments from the Memorial Sloan-Kettering Cancer Center in New York.

Chapters 33–35 cover thoracic surgical and therapeutic procedures which are less common but still form a basic part of thoracic anesthesia such as broncho-pleural fistula, bullectomy, hydatid cysts, massive hemoptysis, and broncho-pulmonary lavage. I am particularly thankful to Jean Bussières, University of Laval, Quebec, for sharing his large experience in whole-lung lavage.

The next section Chaps. 36–38 deals with anesthetic management of thoracic surgery for end-stage lung diseases: Lung Volume Reduction (Erin Sullivan, Pittsburgh), Lung Transplantation (Andy Roscoe, Manchester, UK), and Pulmonary Thrombo-endarterectomy (Gerry Manecke, San Diego). These chapters encompass the leading edge of anesthetic management for these severely ill patients.

Chapter 39 is directed to the specific issues and pathologies related to thoracic surgery in pediatrics. This comprehensive chapter by Drs. Schwartz and Karsli from the Hospital for Sick Children, here in Toronto, covers lung isolation in pediatrics, tracheo-esophageal fistula, diaphragmatic hernia, and the entire range of problems in children and infants that may require thoracic surgery either in a large teaching hospital or in a smaller regional center. Chapter 40 by Stephen Panaro provides a useful systematic approach to anesthesia for the patient with Thoracic Trauma.

The final section, Chaps. 41–47, deals with topics in the area of thoracic postoperative care that the anesthesiologist may be required to manage. These include immediate complications such as cardiac herniation (Chap. 41) and Respiratory Failure (Chap. 42). Chapter 43 by Vera von Dossow-Hanfstingl and a group of Anesthesiologists from Munich and Berlin gives an exciting look at the increasing use of modern technology, beyond standard ventilatory support, such as interventional lung assist to manage respiratory failure in these patients. Chapter 44 gives a detailed look at cardiac complications after thoracic surgery. Chapter 45 on postthoracotomy surgical management includes what every anesthesiologist needs to know in this area, particularly about chest drainage systems. I thank Dirk Wagnetz and Marc de Perrot of our own Thoracic Surgical Division for this chapter. Chapter 46 by Drs. Pennefather and McKevith, Liverpool, UK, is a thorough presentation of multimodal analgesia after thoracic surgery and the wide-range of available options. The final chapter by Peter MacDougall, Dalhousie University, Halifax, deals with the increasingly recognized problem of chronic post-thoracotomy pain.

I hope that the reader of this text whether involved in a University or Community practice will be able to increase their comprehension of the issues related to thoracic anesthesia and this in turn will benefit their patients.

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Peter Slinger
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Slinger, MD, FRCPC, P. (Ed.)
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