Surgery

Second Edition
To our families
When the first edition of Surgery: Basic Science and Clinical Practice published, evidence-based medicine principles were just starting to be embraced by the surgery community. Our second edition comes at a critical time in surgical care when surgeons are expected to use the best available evidence to support their every day decisions in patient care, citing critical scientific evidence to support their decisions. No longer is it acceptable to simply say, “We do it this way because we always do it this way.” The practice of surgery has evolved from considering the principles of evidence-based medicine to actively incorporating those principles into practice. We have taken great care to ensure that Surgery meets the needs of both students and clinicians, providing the scientific background, the clinical decision-making skills, and the surgical techniques to provide the best possible patient care.

For this new edition, the editorial board has recruited a new member of the team. In order to provide the necessary emphasis on trauma and critical care, we asked Dr. Philip S. Barie to work with Dr. Stephen F. Lowry to thoroughly expand and improve those topics. The reader will quickly see the added depth and scope of coverage—a marked improvement over the previous edition. We have thoroughly revised every chapter and sharpened the focus on our evidence-based approach, including EBM tables and enhanced figures in every chapter. New chapters discuss transfusion therapy, intraabdominal and nosocomial infections, severe sepsis and shock, mechanical ventilation, imaging in critical care patients, burns and inhalation injury, vascular trauma, traumatic injury of the spine, and surgical rehabilitation. We have identified particular patient populations that require specialized care, including the elderly, neonates, children, and obese patients. We also discuss the needs of pregnant and immunocompromised patients, who require variations in surgical management and care. These chapters are well-illustrated and packed with important evidence to allow enlightened choices.

We have included new chapters on vascular access for dialysis, chemotherapy and nutritional support, thoracic infections, and video-assisted thoracic surgery. The transplant section has been brought up to date and expanded to include transplantation of the intestine. Fundamentals of cancer genomics and proteomics and fundamentals of cancer cell biology and molecular targeting are essential to changes in cancer patient care and treatment, so we have expanded those topics in the oncology section. Finally, there is a new section on biomaterials, energy transfer, and robotics that provide the busy practicing surgeon with new methods and innovative perspectives for modern surgical care. In summary, the book has been thoroughly updated with recent advances in both scientific evidence and clinical practice, including 28 new chapters discussing exciting new areas in surgery. We have focused on current references and evidence to give the reader the most up-to-date information possible.

We hope you will agree that this book, with its consistent and long-established EBM focus, is different from other surgical textbooks. The contributing authors are all clinically active experts who have written comprehensive, current chapters. We believe the chapters on emerging topics strike a balance describing both the current status of practice and the possibilities on the horizon. The chapters have been carefully edited to provide a smooth, readable text. As in previous editions, the evidence-based tables provide information that is consistently formatted and carefully rated, based on the quality of the study design and conduct.

We will soon be embracing the changes in both learning and practice brought on by the ubiquity of computers in medicine. In addition to the print version of this book, we will bring together the timely content of journal articles with the authoritative content of a traditional textbook. At our soon-to-be launched web portal, users will be able to call up topics by book chapter, by general subject, or through a search function. (Similarly, journal readers will be able to access the content of Surgery when reading articles in a linked journal.) From this portal, users can navigate easily and seamlessly between book chapters, journal articles, and, where available, videoclips. An online image library, references linked to online databases with full text retrieval (when available), and related clinical and biomedical data will also be available. In addition, an e-book version of Surgery: Basic Science and Clinical Evidence is now available, in combination with the print book or as a stand-alone digital resource.
In short, *Surgery: Basic Science and Clinical Evidence* continues to be different and exciting. We have strived to combine the past and present, with an optimistic eye to the future. *Surgery* represents the state of the art and science of the full range of surgical practice as we now know it. We hoped to expand on our past success and create a key reference source for residents and students. We hope readers are as excited about this edition as we are and we invite you to send your comments. Please let us hear from you, as we want to update the book frequently, continuing to improve upon it and make it more reader friendly. We wish you good reading.

Jeffrey A. Norton, MD, FACS  
Philip S. Barie, MD, MBA, FCCM, FACS  
R. Randal Bollinger, MD, PhD, FACS  
Alfred E. Chang, MD, FACS  
Stephen F. Lowry, MD, MBA, FACS  
Sean J. Mulvihill, MD, FACS  
Harvey I. Pass, MD, FACS  
Robert W. Thompson, MD, FACS  
January 2008
The Editorial Board wishes to thank both the editorial and production staff at Springer for their support and encouragement, Mary Shirazi, whose wonderful medical illustrations appear throughout the book, and Barbara Chernow and Kathy Jackson-Cleghorn of Chernow Editorial Services for their outstanding work in coordinating the production of this text.

I personally would also like to thank my family members for their continued help and support, specifically Cathy, John, Meg, Pat, and Tim.

Jeffrey A. Norton, MD

This book is dedicated to all who thirst for knowledge, and strive to improve the care of the surgical patient.

Philip S. Batie, MD, MBA

The untiring support and encouragement of my wife, Monika Bollinger is gratefully acknowledged. I sincerely appreciate the superb work of each author who contributed to the transplantation section and especially the participation of my former colleagues and trainees, Drs. Duane Davis, Douglas Farmer, Bob Harland, Allan Kirk, Stuart Knechtle, Christine Lau, Brian Lima, and Betsy Tuttle-Newhall.

R. Randal Bollinger, MD, PhD

To my wife, Lana, for her support in this effort.

Alfred E. Chang, MD

To Susette, Alex, Lorna, and Kate, who make the “day job” all the more meaningful, and to Debbie, Micki, and Lynn, who help make the “day job” a pleasure. To my mentors, Dick Kraft, Frank Moody, Murray Brennan, and Tom Shires, who instilled a love of surgery and imparted (hopefully) a modicum of their great wisdom.

Stephen F. Lowry, MD

To the surgical trainees who will use this reference for inspiring me with their commitment to excellence, to my own mentor, Haile Debas, MD, for his teaching, advice, and support, and to my wife Kim and sons Michael, Jeffrey, and Timothy for bringing joy to my life.

Sean J. Mulvihill, MD

To my family, Helen, Eric, and Ally Pass, for their constant support.

Harvey I. Pass, MD

To my surgical mentors, Norm Thompson (dad), John Mannick, Ron Stoney, and Greg Sicard, for their inspiration and instruction. To my students, residents, and fellows, who keep me challenged, and to Della for keeping it all in order. To my wonderful wife Michelle and the joy of our lives, Taylor Alexandra, who makes it all worthwhile.

Robert W. Thompson, MD
## Contents

Preface .......................................................... vii  
Acknowledgments ............................................... ix  
Contributors .................................................. xix  
Evidence-Based Tables ....................................... xxxiii

### Section One  Fundamentals of Surgical Care

1 Origins of Modern Surgery ................................. 3  
   Ira M. Rutkow

2 Evidence-Based Surgery .................................. 21  
   Robin S. McLeod

3 Cell Structure, Function, and Genetics ............... 37  
   Siobhan A. Corbett and Ramsey A. Foty

4 Mediators of Inflammation and Injury ............... 75  
   Stephen F. Lowry, Edward Lin, and Steve E. Calvano

5 Substrate Metabolism ................................... 101  
   Edward Lin and Stephen F. Lowry

6 Nutrition .................................................. 111  
   Kenneth A. Kudsk and Danny O. Jacobs

7 Perioperative Fluids and Electrolytes ............... 139  
   Avery B. Nathens and Ronald V. Maier

8 Hemostasis and Coagulation ........................... 149  
   Marcel Levi and Tom van der Poll

9 Transfusion Therapy .................................... 167  
   Lena M. Napolitano

10 Wounds: Biology, Pathology, and Management ...... 191  
    H. Peter Lorenz and Michael T. Longaker

11 Diagnosis and Treatment of Infection ............... 209  
    David L. Dunn

12 Infections of Skin and Soft Tissue ................. 237  
    Philip S. Barie and Soumitra R. Eachempati

13 Intraabdominal Infections ........................... 259  
    Michael A. West and Michael B. Shapiro
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Nosocomial Infections</td>
<td>Pamela A. Lipsett</td>
<td>273</td>
</tr>
<tr>
<td>15</td>
<td>Severe Sepsis and Septic Shock</td>
<td>Steven M. Opal</td>
<td>287</td>
</tr>
<tr>
<td>16</td>
<td>Shock and Resuscitation</td>
<td>Avery B. Nathens and Ronald V. Maier</td>
<td>305</td>
</tr>
<tr>
<td>17</td>
<td>Perioperative Management</td>
<td>Avery B. Nathens and Ronald V. Maier</td>
<td>323</td>
</tr>
<tr>
<td>18</td>
<td>Anesthesia</td>
<td>Joseph D. Tobias and Russell Wall</td>
<td>353</td>
</tr>
<tr>
<td>19</td>
<td>Management of Perioperative Pain</td>
<td>Susannah S. Wise</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td><strong>Section Two</strong> Biology and Practice of Trauma and Critical Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Development of Trauma and Critical Care</td>
<td>G. Tom Shires</td>
<td>397</td>
</tr>
<tr>
<td>21</td>
<td>Trauma Systems, Triage, and Disaster Management</td>
<td>Jeffrey Hammond</td>
<td>403</td>
</tr>
<tr>
<td>22</td>
<td>Monitoring of Cardiovascular and Respiratory Function</td>
<td>Philip S. Barie and Soumitra R. Eachempati</td>
<td>409</td>
</tr>
<tr>
<td>23</td>
<td>Imaging of the Critically Ill Patient</td>
<td>Amy D. Wyrzykowski and Grace S. Rozycki</td>
<td>423</td>
</tr>
<tr>
<td>24</td>
<td>Risk Prediction, Disease Stratification, and Outcome Description in Critical Surgical Illness</td>
<td>John C. Marshall</td>
<td>433</td>
</tr>
<tr>
<td>25</td>
<td>Burns and Inhalation Injury</td>
<td>Roger W. Yurt</td>
<td>447</td>
</tr>
<tr>
<td>26</td>
<td>Traumatic Brain Injury</td>
<td>Kyle Chapple and Roger Hartl</td>
<td>461</td>
</tr>
<tr>
<td>27</td>
<td>Trauma to the Torso</td>
<td>Deborah M. Stein and Thomas M. Scalea</td>
<td>471</td>
</tr>
<tr>
<td>28</td>
<td>Trauma to the Pelvis and Extremities</td>
<td>Dean G. Lotich, Michael J. Gardner, and David L. Helfet</td>
<td>505</td>
</tr>
<tr>
<td>29</td>
<td>Vascular Trauma</td>
<td>Peter P. Lopez and Enrique Ginzberg</td>
<td>521</td>
</tr>
<tr>
<td>30</td>
<td>Traumatic Injury of the Spine</td>
<td>Justin F. Fraser, John Boockvar, and Roger Hartl</td>
<td>545</td>
</tr>
<tr>
<td>31</td>
<td>Multiple Organ Dysfunction Syndrome</td>
<td>Donald E. Fry</td>
<td>563</td>
</tr>
<tr>
<td>32</td>
<td>Mechanical Ventilation</td>
<td>David J. Dries and John F. Perry, Jr.</td>
<td>577</td>
</tr>
</tbody>
</table>

*Deceased
## Contents

### Section Three Care of Unique Populations

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Pediatric Surgery</td>
<td>649</td>
</tr>
<tr>
<td>37</td>
<td>Surgery in the Immunocompromised Patient</td>
<td>697</td>
</tr>
<tr>
<td>38</td>
<td>Evidence-Based Bariatric Surgery</td>
<td>709</td>
</tr>
<tr>
<td>39</td>
<td>Surgical Care of the Pregnant Patient</td>
<td>729</td>
</tr>
<tr>
<td>40</td>
<td>Palliative and End-of-Life Care</td>
<td>737</td>
</tr>
</tbody>
</table>

### Section Four Gastrointestinal and Abdominal Surgery

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>History of Surgery of the Gastrointestinal Tract</td>
<td>743</td>
</tr>
<tr>
<td>42</td>
<td>Assessment of Acute Abdominal Symptoms</td>
<td>759</td>
</tr>
<tr>
<td>43</td>
<td>Principles of Minimally Invasive Surgery</td>
<td>771</td>
</tr>
<tr>
<td>44A</td>
<td>Esophagus: Benign Diseases of the Esophagus</td>
<td>791</td>
</tr>
<tr>
<td>44B</td>
<td>Malignant Tumors of the Esophagus</td>
<td>827</td>
</tr>
<tr>
<td>45</td>
<td>Stomach and Duodenum</td>
<td>841</td>
</tr>
<tr>
<td>46</td>
<td>Pancreas</td>
<td>875</td>
</tr>
<tr>
<td>47</td>
<td>Biliary System</td>
<td>911</td>
</tr>
<tr>
<td>48</td>
<td>Liver</td>
<td>943</td>
</tr>
<tr>
<td>49</td>
<td>Small Intestine</td>
<td>963</td>
</tr>
<tr>
<td>50</td>
<td>Appendix</td>
<td>991</td>
</tr>
</tbody>
</table>
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Colon, Rectum, and Anus</td>
<td>1011</td>
</tr>
<tr>
<td></td>
<td>Mark L. Welton, Andrew A. Shelton, George J. Chang, and Madhulika G. Varma</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Spleen</td>
<td>1111</td>
</tr>
<tr>
<td></td>
<td>Alan T. Lefor and Edward H. Phillips</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Hernias and Abdominal Wall Defects</td>
<td>1133</td>
</tr>
<tr>
<td></td>
<td>Daniel J. Scott and Daniel B. Jones</td>
<td></td>
</tr>
</tbody>
</table>

## Section Five  
Endocrine Surgery

| 54 | History of Endocrine Surgery | 1181 |
| | Jeffrey A. Norton |
| 55 | Parathyroid | 1189 |
| | Matthew B. Bloom and Jeffrey A. Norton |
| 56 | Thyroid | 1211 |
| | Ronald J. Weigel |
| 57 | Adrenal | 1229 |
| | Robert Udelsman |
| 58 | Neuroendocrine Tumors of the Pancreas and Gastrointestinal Tract and Carcinoid Disease | 1249 |
| | David A. Peterson, James P. Dolan, and Jeffrey A. Norton |
| 59 | Multiple Endocrine Neoplasia | 1285 |
| | Terry C. Lairmore |

## Section Six  
Vascular Surgery

| 60 | History of Vascular Surgery | 1299 |
| | Jesse E. Thompson |
| 61 | Pathobiology of Vascular Disease | 1317 |
| | Bryan W. Tillman and Randolph L. Geary |
| 62 | Cerebrovascular Disease | 1337 |
| | Peter L. Faries, Sheela T. Patel, and K. Craig Kent |
| 63 | Diseases of the Thoracic Aorta | 1359 |
| | Marineh Yagubian and Thoralf M. Sundt |
| 64 | Diseases of the Great Vessels and the Thoracic Outlet | 1375 |
| | Spencer J. Melby and Robert W. Thompson |
| 65 | Abdominal Aortic Aneurysms | 1397 |
| | B. Timothy Baxter and Brad A. Winterstein |
| 66 | Arterial Disease of the Lower Extremity | 1413 |
| | Michael A. Golden |
| 67 | Venous Disease and Pulmonary Embolism | 1429 |
| | Gregory L. Moneta and Mathew I. Foley |
| 68 | Vascular Access for Dialysis, Chemotherapy, and Nutritional Support | 1457 |
| | R. Randal Bollinger and Stuart J. Knechtle |
# Section Seven  Thoracic Surgery

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>69</td>
<td>History of Cardiac Surgery</td>
<td>1471</td>
</tr>
<tr>
<td></td>
<td>Larry W. Stephenson</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>Preoperative and Postoperative Care of the Thoracic Surgery Patient</td>
<td>1481</td>
</tr>
<tr>
<td></td>
<td>Jessica Scott Donington</td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>Lung Neoplasms</td>
<td>1491</td>
</tr>
<tr>
<td></td>
<td>Frank C. Detterbeck, Scott N. Gettinger, and Mark A. Socinski</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Thoracic and Pulmonary Infections</td>
<td>1525</td>
</tr>
<tr>
<td></td>
<td>Frank A. Baciewicz, Jr.</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>Video-Assisted Thoracic Surgery</td>
<td>1535</td>
</tr>
<tr>
<td></td>
<td>Matthew J. Schuchert, James D. Luketich, and Hitan C. Fernando</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Pleura: Anatomy, Physiology, and Disorders</td>
<td>1551</td>
</tr>
<tr>
<td></td>
<td>Joseph S. Friedberg and John C. Kucharczuk</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>Mediastinum</td>
<td>1571</td>
</tr>
<tr>
<td></td>
<td>Mark I. Block</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Congenital Heart Disease</td>
<td>1601</td>
</tr>
<tr>
<td></td>
<td>Carl L. Backer and Constantine Mavroudis</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Adult Heart Disease</td>
<td>1621</td>
</tr>
<tr>
<td></td>
<td>Todd K. Rosengart, William de Bois, Edgar Chedrawy, and Malica Vukovic</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Cardiac Replacement Therapy</td>
<td>1669</td>
</tr>
<tr>
<td></td>
<td>Benjamin C. Sun</td>
<td></td>
</tr>
</tbody>
</table>

# Section Eight  Transplantation Surgery

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>79</td>
<td>History of Clinical Transplantation</td>
<td>1681</td>
</tr>
<tr>
<td></td>
<td>Thomas E. Starzl</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Immunology of Transplantation</td>
<td>1705</td>
</tr>
<tr>
<td></td>
<td>Allan D. Kirk and Eric A. Elster</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Rejection</td>
<td>1737</td>
</tr>
<tr>
<td></td>
<td>J. Richard Thistlethwaite and David Bruce</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Principles of Organ Preservation</td>
<td>1747</td>
</tr>
<tr>
<td></td>
<td>Brian Lima and J.E. Tuttle-Newhall</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>Kidney Transplantation</td>
<td>1759</td>
</tr>
<tr>
<td></td>
<td>Stuart J. Knechtle</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Pancreas and Islet Transplantation</td>
<td>1773</td>
</tr>
<tr>
<td></td>
<td>Robert C. Harland and Marc R. Garfinkel</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>Liver Transplantation</td>
<td>1787</td>
</tr>
<tr>
<td></td>
<td>Douglas W. Hanto, Scott R. Johnson, Seth J. Karp, and Khalid Khwaja</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>Transplantation of the Intestine</td>
<td>1827</td>
</tr>
<tr>
<td></td>
<td>Fady M. Kaldas and Douglas G. Farmer</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>Lung Transplantation</td>
<td>1839</td>
</tr>
<tr>
<td></td>
<td>Christine L. Lau, G. Alexander Patterson, and R. Duane Davis</td>
<td></td>
</tr>
</tbody>
</table>
Section Nine  Cancer Surgery

89 History of Surgical Oncology .................................................. 1889
Walter Lawrence, Jr.

90 Genetics of Cancer .................................................................. 1901
John E. Phay and Jeffrey F. Moley

91 Fundamentals of Cancer Genomics and Proteomics .................. 1925
Jimmy C. Sung, Alice Y. Lee, and Timothy J. Yeatman

92 Fundamentals of Cancer Cell Biology and Molecular Targeting .... 1933
Steven N. Hochwald, David Bloom, Vita Golubovskaya, and William G. Cance

93 Immunology of Cancer ............................................................... 1947
Craig L. Slingluff, Jr.

94 Principles of Cancer Surgery ..................................................... 1965
John H. Donohue

95 Radiation as an Adjunct to Surgery ............................................ 1985
Barbara-Ann Millar and Laura A. Dawson

96 Benign and Malignant Diseases of the Breast ......................... 2005
Helen A. Pass

97 Melanoma and Other Cutaneous Malignancies ....................... 2037
Vernon K. Sondak, Eric H. Jensen, and Kim A. Margolin

98 Soft Tissue Sarcoma ................................................................. 2061
Peter W.T. Pisters

99 Gastrointestinal Stromal Tumors .............................................. 2087
Jason S. Gold and Ronald P. DeMatteo

100 Head and Neck Malignancies .................................................. 2097
Jeffrey S. Moyer and Carol R. Bradford

101 Surgical Emergencies in the Cancer Patient ............................ 2117
Jeffrey J. Sussman

102 Nutritional Care of Cancer Patients ....................................... 2123
David A. August and Maureen B. Huhmann

103 Regional Therapy of Cancer .................................................. 2151
Douglas L. Fraker

Section Ten  Associated Disciplines

104 Urology ................................................................................. 2175
Joseph C. Presti, Jr.

105 Gynecology ........................................................................... 2197
Hillary B. Boswell, Janet S. Rader, and David E. Cohn
CONTENTS xvii

106 Neurosurgery ................................................................. 2217
  Philip Starr

107 Orthopaedic Surgery ....................................................... 2233
  David W. Lowenberg and Andrew Fang

108 Plastic Surgery ............................................................... 2263
  W. Thomas Lawrence and Adam Lowenstein

Section Eleven  Modern Practice of Surgery

  Technology, the Surgeon, and Surgical Innovation: An Introduction .................. 2289
  Michael E. Gertner and Thomas Krummel

109 Biomaterials and the Evolution of Hernia Repair I: The History of Biomaterials and
  the Permanent Meshes ...................................................... 2291
  Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner

110 Biomaterials and the Evolution of Hernia Repair II: Composite Meshes .................. 2305
  Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner

111 Biomaterials and the Evolution of Hernia Repair III: Biologically Derived
  Prosthetic Meshes ............................................................ 2317
  Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner

112 Injectable Biomaterials in Surgery ......................................... 2325
  Bilal Shafi, Carlos Mery, Gary Binyamin, Joseph Knight, and Michael E. Gertner

113 Energy Transfer in the Practice of Surgery .................................... 2345
  James Wall and Michael E. Gertner

114 Robot-Assisted Surgery: Technology and Current Clinical Status ....................... 2355
  Russell K. Woo, David A. Peterson, David Le, Michael E. Gertner,
  and Thomas Krummel

Index .................................................................................. 2373
Contributors

Craig T. Albanese, MD
Professor, Pediatrics and Obstetrics and Gynecology, Department of Surgery, Stanford University Medical Center; Chief, Division of Pediatric Surgery and Director of Surgical Services, Lucile Packard Children’s Hospital, Stanford, CA, USA

David A. August, MD
Associate Professor, Chief, Division of Surgical Oncology, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, and the Cancer Institute of New Jersey, New Brunswick, NJ, USA

Frank A. Baciewicz, Jr., MD
Associate Professor, Department of Cardio-Thoracic Surgery, Wayne State University/Harper Hospital, Detroit, MI, USA

Carl L. Backer, MD
A. C. Buehler Professor, Division of Cardiovascular-Thoracic Surgery, Department of Surgery, Children’s Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Philip S. Barie, MD, MBA
Professor, Departments of Surgery and Public Health; Chief, Division of Critical Care and Trauma, NewYork-Presbyterian Hospital/Weill Cornell Medical College, New York, NY, USA

B. Timothy Baxter, MD
Professor, Department of Surgery, University of Nebraska Medical Center and the Methodist Hospital, Omaha, NE, USA

Gary Binyamin, PhD
Surgical Innovation Fellow, Department of Surgery, Stanford University, James H. Clark Center, Stanford, CA, USA

Mark J. Block, MD
Director, Department of Thoracic Oncology, Memorial Regional Cancer Center, Hollywood, FL, USA

David Bloom, PhD
Postdoctoral Associate, Department of Surgery, University of Florida College of Medicine, Gainesville, FL, USA

Matthew B. Bloom, MD
Resident, Department of Surgery, Stanford University, Stanford, CA, USA

R. Randal Bollinger, MD, PhD
Professor, Departments of Surgery and Immunology, Duke University Medical Center, Durham, NC, USA

Roxana M. Bologa, MD
Assistant Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Co-Director, Peritoneal Dialysis, The Rogosin Institute, New York, NY, USA
John Boockvar, MD
Alvina and Willis Murphy Assistant Professor, Departments of Neurological Surgery, and Surgery, Weill Cornell Medical College, New York, NY, USA

Hillary B. Boswell, MD
Staff Physician, The Women's Specialists of Houston, General Obstetrics and Adult Gynecology, Pediatric and Adolescent Gynecology, St. Luke's Medical Tower, Houston, TX, USA

Carol R. Bradford, MD, FACS
Medical Director, Head and Neck Cancer Clinic, Professor, Department of Otolaryngology/Head and Neck Surgery, University of Michigan, UM Comprehensive Cancer Center, Ann Arbor, MI, USA

David Bruce, MD, FACS
Transplant Surgeon, Department of Transplant Surgery, LifeLink Healthcare Institute, Tampa, FL, USA

Steve E. Calvano, PhD
Associate Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

William G. Cance, MD
Professor and Chairman, Department of Surgery, University of Florida College of Medicine, Gainesville, FL, USA

Kathleen King Casey, MD
Chief, Infectious Disease, Department of Medicine, Jersey Shore University Medical Center, Neptune, NJ, USA

George J. Chang, MD
Assistant Professor, Department of Surgical Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, TX, USA

Kyle Chapple, MD
Resident, Department of Neurological Surgery, Weill Cornell Medical College, New York, NY, USA

Edgar Chedrawy, MD
Assistant Professor, Department of Surgery, University of Illinois at Chicago, Chicago, IL, USA

David E. Cohn, MD
Associate Professor, Divisions of Gynecologic Oncology, Departments of Obstetrics and Gynecology, The Ohio State University College of Medicine and Public Health, Columbus, OH, USA

Siobhan A. Corbett, MD
Associate Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, Clinical Academic Building, New Brunswick, NJ, USA

Raul A. Cortes, MD
Clinical Fellow, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA

Myriam J. Curet, MD, FACS
Associate Professor, Department of Surgery, Stanford University, Stanford, CA, USA

Gail Darling, MD, FACS, FRCSC
Associate Professor, Department of Thoracic Surgery, University Health Network, Toronto, Ontario, Canada

John Mihran Davis, MD
Professor, Department of Surgery, Jersey Shore University Medical Center, Neptune, NJ, USA

R. Duane Davis, MD
Professor, Division of Cardiothoracic Surgery, Department of Surgery, Duke University Medical Center, Durham, NC, USA
Laura A. Dawson, MD
Assistant Professor, Department of Radiation Oncology, University of Toronto/Princess Margaret Hospital, Toronto, Ontario, Canada

Haile T. Debas, MD
Executive Director, UCSF Global Health Sciences; Maurice Galante Distinguished Professor, Dean Emeritus, School of Medicine, Vice Chancellor Emeritus, Medical Affairs, Chancellor Emeritus, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA

William de Bois, MD
Fellow, Department of Surgery, Heart Center at Stony Brook, Stony Brook University, Stony Brook, NY, USA

Ronald P. DeMatteo, MD
Vice Chair, Department of Surgery; Head, Division of General Surgical Oncology; Director, General Surgical Oncology Fellowship Program, Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Frank C. Detterbeck, MD
Professor, Section Chief, Surgical Director, Department Thoracic Oncology; Associate Director, Department for Clinical Affairs, Yale Cancer Center, Yale-New Haven Hospital, New Haven, CT, USA

James P. Dolan, MD
Lieutenant Colonel, USAF, MC, Chief, Department of General Surgery, Keesler Medical Center, Biloxi, MI, USA

Jessica Scott Donington, MD
Assistant Professor, Department of Cardiothoracic Surgery, Stanford University Medical Center, Stanford, CA, USA

John H. Donohue, MD
Professor, Department of Surgery, Mayo Medical School; Consultant, Division of Gastroenterologic and General Surgery, Mayo Clinic, Rochester, MN, USA

David J. Dries, MSE, MD
Assistant Medical Director, Department of Surgical Care, HealthPartners Medical Group; John F. Perry, Jr. Professor, Department of Surgery, University of Minnesota, St. Paul, MN, USA

David L. Dunn, MD, PhD
Vice President for Health Sciences, Professor, Department of Surgery, University at Buffalo/SUNY, Buffalo, NY, USA

Soumitra R. Eachempati, MD
Associate Professor, Departments of Surgery and Public Health, Weill Cornell Medical College; Associate Attending Surgeon, NewYork-Presbyterian Hospital, New York, NY, USA

Eric A. Elster, MD
Assistant Professor, Department of Surgery, Uniformed Services University; Transplantation Branch, National Institutes of Health, Bethesda, MD, USA

Andrew Fang, MD
Attending, Department of Orthopedics, South San Francisco Medical Center, San Francisco, CA, USA

Peter L. Faries, MD
Chief, Departments of Endovascular Surgery and Surgery, Cornell University, Weill Cornell Medical College, Columbia University College of Physicians and Surgeons, New York, NY, USA

Douglas G. Farmer, MD
Associate Professor, Department of Surgery, David Geffen School of Medicine at UCLA; Director, Intestinal Transplant Program, Director, Pediatric Liver Transplant Program, Co-Director, Intestinal Failure Center, Division of Liver and Pancreas Transplantation, Dumont UCLA Transplant Center, Los Angeles, CA, USA
Alison M. Fecher, MD
Fellow, Department of Surgery, Duke University Medical Center, Durham, NC, USA

Hiran C. Fernando, MBBS
Associate Professor, Department of Cardiothoracic Surgery, Boston University, Boston, MA, USA

Mathew I. Foley, MD
Vascular Surgeon, Legacy Columbia Vascular and Endovascular Division, Legacy Emanuel Hospital and Health Center, Portland, OR, USA

Ramsey A. Foty, PhD
Assistant Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Douglas L. Fraker, MD
Jonathon Rhoads Professor, Department of Surgery, Vice-Chairman, Clinical Affairs, Department of Surgery, University of Pennsylvania, Philadelphia, PA, USA

Justin F. Fraser, MD
Resident, Department of Neurological Surgery, New York-Presbyterian Hospital, New York, NY, USA

Joseph S. Friedberg, MD
Associate Professor, Chief, Division of Thoracic Surgery, Department of Surgery, University of Pennsylvania Medical Center at Presbyterian, Philadelphia, PA, USA

Donald E. Fry, MD
Adjunct Professor, Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Michael J. Gardner, MD
Senior Clinical Associate, Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY, USA

Marc R. Garfinkel, MD
Assistant Professor, Department of Surgery, University of Chicago Medical Center, Center for Advanced Medicine, Chicago, IL, USA

Randolph L. Geary, MD
Professor, Department of General Surgery, Wake Forest University School of Medicine, Winston-Salem, NC, USA

Michael E. Gertner, MD
Consulting Assistant Professor, Department of Surgery, Stanford University, Stanford, CA, USA

Scott N. Gettinger, MD
Assistant Professor, Department of Medicine, Yale Medical Oncology, New Haven, CT, USA

Enrique Ginzberg, MD
Professor, DeWitt Daughtry Family, Department of Surgery, Miller School of Medicine, University of Miami, Miami, FL, USA

Robert E. Glasgow, MD
Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Claudia E. Goettler, MD
Assistant Professor, Traumatology and Surgical Critical Care, Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC, USA

Jason S. Gold, MD
Staff Surgeon, Surgical Service VA Boston Healthcare System, West Roxbury MA; Lecturer, Department of Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA
Michael A. Golden, MD  
Chief, Division of Vascular Surgery and Endovascular Therapy, Department of Surgery, Penn Presbyterian Medical Center, Philadelphia, PA, USA

Vita Golubovskaya, PhD  
Research Assistant Professor, Department of Surgery, University of Florida College of Medicine, Gainesville, FL, USA

Jeffrey Hammond, MD, MBA, MPH  
Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Douglas W. Hanto, MD, PhD  
Lewis Thomas Professor, Department of Surgery, Harvard Medical School; Chief, Division of Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

Robert C. Harland, MD  
Associate Professor, Departments of Surgery and Medicine, Director, Kidney and Pancreas Transplantation, Comer Children’s Hospital, University of Chicago, Center for Advanced Medicine, Chicago, IL, USA

Hobart W. Harris, MD, MPH  
Professor and Chief, Division of General Surgery, Vice-Chair, Department of Surgery, University of California, San Francisco, CA, USA

Roger Hartl, MD  
Assistant Professor, Neurological Surgery, Weill Cornell Medical College, New York, NY, USA

David L. Helfet, MD  
Professor, Department of Orthopaedic Surgery, Weill Cornell Medical Center, Director, Orthopedic Trauma Service, Hospital for Special Surgery/NewYork-Presbyterian Hospital, New York, NY, USA

Steven N. Hochwald, MD  
Assistant Professor, Department of Surgical Oncology, Molecular Genetics and Microbiology, University of Florida College of Medicine, Gainesville, FL, USA

Richard A. Hodin, MD  
Associate Professor, Department of Surgery, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

Maureen B. Huhmann, MS, RD  
Instructor, Department of Primary Care, University of Medicine and Dentistry of New Jersey, New Brunswick, NJ, USA

Danny O. Jacobs, MD, MPH  
Professor and Chairman, Department of Surgery, Duke University Medical Center, Durham, NC, USA

Eric H. Jensen, MD  
Fellow, Department of Surgical Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

Scott R. Johnson, MD  
Instructor, Department of Surgery, Harvard Medical School; Surgical Director of Kidney Transplantation, Beth Deaconess Medical Center, Boston, MA, USA

Daniel B. Jones, MD  
Associate Professor, Harvard Medical School; Chief, Minimally Invasive Surgery, Beth Israel Deaconess Medical Center, Boston, MA, USA

Fady M. Kaldas, MD  
Surgical Research Fellow, Department of Surgery, University of California, Los Angeles, CA, USA
CONTRIBUTORS

Seth J. Karp, MD
Assistant Professor, Department of Surgery, Harvard Medical School, Division of Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

K. Craig Kent, MD
Chief, Combined Columbia and Cornell Division of Vascular Surgery, New York-Presbyterian Hospital, New York, NY; Professor, Department of Surgery, Columbia University College of Physicians and Surgeons, New York; Greenberg-Starr Professor, Department of Surgery, Weill Cornell Medical College, New York, NY, USA

Khalid Khwaja, MD
Instructor, Department of Surgery, Harvard Medical School; Surgical Director of Pancreas Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

Allan D. Kirk, MD, PhD
Chief, Transplantation Branch, National Institutes of Health, Bethesda, MD, USA

Stuart J. Knechtle, MD
Ray D. Owen Professor, Departments of Transplantation and Surgery, University of Wisconsin Medical School, Madison, WI, USA

Joseph Knight, MS
Biodesign Innovation Fellow, Department of Cardiovascular Medicine, Stanford University, Stanford, CA, USA

Daniel Kreisel, MD, PhD
Assistant Professor, Division of Cardiothoracic Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

Thomas Krummel, MD
Emile Holman Professor and Chair, Department of Surgery, Division of Pediatric Surgery, Stanford University, Stanford, CA, USA

John C. Kucharzuk, MD
Assistant Professor, Department of Cardiothoracic Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, USA

Kenneth A. Kudsk, MD
Professor, Department of Surgery, Vice Chairman of Surgical Research, University of Wisconsin-Madison, Madison, WI, USA

Terry C. Lairmore, MD
Director, Division of Surgical Oncology, Scott and White Memorial Hospital and Clinic, Texas A&M University System Health Science Center, Temple, TX, USA

Christine L. Lau, MD
Fellow, Division of Cardiothoracic Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

W. Thomas Lawrence, MD, MPH
Professor and Chief, Department of Plastic Surgery, University of Kansas Medical Center, Sutherland Institute, Kansas City, KS, USA

Walter Lawrence, Jr., MD
Professor Emeritus, Division of Surgical Oncology, Department of Surgery, Virginia Commonwealth University College of Medicine, Richmond, VA, USA

David Le, MD
Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Alice Y. Lee, MS
Computation Biologist, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA
Hanmin Lee, MD
Associate Professor, Department of Surgery, Pediatrics, and OB-Gyn and Reproductive Services, University of California, San Francisco, San Francisco, CA, USA

Alan T. Lefor, MD, MPH
Professor, Department of Surgery, Jichi Medical University, Center for Graduate Medical Education, Shimotsuke, Tochigi, Japan

Marcel Levi, MD, PhD
Professor, Department of Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Brian Lima, MD
Research Fellow, Department of Cardiothoracic Surgery, Duke University, Durham, NC, USA

Edward Lin, MD
Assistant Professor, Department of Surgery, Emory University School of Medicine, Atlanta, GA, USA

Pamela A. Lipsett, MD
Professor, Department of Surgery, Anesthesiology/Critical Care Medicine, Johns Hopkins University Schools of Medicine and Nursing, Baltimore, MD, USA

Michael T. Longaker, MD, MBA
Deane P. and Louise Mitchell Professor, Department of Surgery (Plastic and Reconstructive); Director, Children's Surgical Research, Lucile Packard Children’s Hospital, Stanford University School of Medicine, Stanford, CA, USA

Peter P. Lopez, MD
Assistant Professor, DeWitt Daughtry Family, Department of Surgery, Miller School of Medicine, University of Miami, Ryder Trauma Center, Jackson Memorial Medical Center, Miami, FL, USA

H. Peter Lorenz, MD
Associate Professor, Department of Surgery (Plastic and Reconstructive); Investigator, Children’s Surgical Research Program, Stanford University School of Medicine, Stanford, CA, USA

Dean G. Lorich, MD
Assistant Professor, Department of Orthopedic Surgery, Weill Cornell Medical Center; Associate Director, Orthopaedic Trauma Service, Hospital for Special Surgery/NewYork-Presbyterian Hospital, New York, NY, USA

David W. Lowenberg, MD
Chairman, Department of Orthopedic Surgery, California Pacific Medical Center, San Francisco, CA, USA

Adam Lowenstein, MD
Private Practice, Mendacito Center for Aesthetic Plastic Surgery, Santa Barbara, CA, USA

Stephen F. Lowry, MD, MBA
Professor and Chairman, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Erika J. Lu, MD
Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

James D. Luketich, MD
Professor, Department of Surgery; Chief, Division of Thoracic and Foregut Surgery, University of Pittsburgh, Pittsburgh, PA, USA

Ronald V. Maier, MD
Jane and Donald D. Trunkey Professor, Vice Chair, Department of Surgery; Surgeon-in-Chief, Department of Surgery, Harborview Medical Center, Seattle, WA, USA
Kim A. Margolin, MD
Associate Director for Clinical Research, Division of Medical Oncology and Therapeutics Research; Professor, Division of Hematology and Hematopoietic Cell Transplantation; Staff Physician, Medical Oncology, City of Hope National Medical Center, Duarte, CA, USA

John C. Marshall, MD
Professor, Department of Surgery, Critical Care Medicine, University of Toronto/St. Michael’s Hospital, Toronto, Ontario, Canada

Jeffrey B. Matthews, MD
Christian R. Holmes Professor, Chairman, Department of Surgery, University of Cincinnati College of Medicine, Cincinnati, OH, USA

Constantine Mavroudis, MD
Willis J. Potts Professor, Department of Surgery; Surgeon-in-Chief, Division of Cardiovascular-Thoracic Surgery, Children’s Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

David A. McClusky, III, MD
Chief Resident, Department of Surgery, Emory University Hospital, Atlanta, GA, USA

Robin S. McLeod, MD, FRCSC
Professor, Department of Surgery, University of Toronto; Head, Division of General Surgery, Mount Sinai Hospital, Toronto, Ontario, Canada

Spencer J. Melby, MD
Senior Resident, Department of General Surgery, Barnes-Jewish Hospital and Washington University School of Medicine, St. Louis, MO, USA

Carlos Mery, MD, MPH
Surgical Innovation Fellow, Department of Surgery, Stanford University, Mountain View, CA, USA

Barbara-Ann Millar, MBChB
Assistant Professor, Department of Radiation Oncology, University of Toronto/Princess Margaret Hospital, Toronto, Ontario, Canada

Edward Miranda, MD
Attending Surgeon, Department of Plastic and Reconstructive Surgery, California-Pacific Medical Center, San Francisco, CA, USA

Jeffrey F. Moley, MD
Professor, Division of General Surgery, Department of Surgery; Chief, Cancer and Endocrine Surgery Section; Associate Director, Siteman Cancer Center, Washington University School of Medicine, St. Louis, MO, USA

Gregory L. Moneta, MD
Professor and Chief, Department of Vascular Surgery, Oregon Health and Science University, Portland, OR, USA

John Morton, MD, MPH
Director, Department of Bariatric Surgery, Stanford School of Medicine, Stanford, CA, USA

Jeffrey S. Moyer, MD
Assistant Professor, Department of Otolaryngology, Director of Medical Student Education, University of Michigan, A. Alfred Taubman Health Care Center, Ann Arbor, MI, USA

Sean J. Mulvihill, MD
Professor and Chair, Department of Surgery; Senior Director of Clinical Affairs, Huntsman Cancer Institute; The University of Utah, Salt Lake City, UT, USA
CONTRIBUTORS

Lena M. Napolitano, MD
Professor, Department of Surgery; Chief, Surgical Critical Care; Program Director, Surgical Critical Care Fellowship; Associate Chair, Department of Critical Care, University of Michigan School of Medicine, Ann Arbor, MI, USA

Avery B. Nathens, MD, PhD, MPH
Associate Professor, Director, Surgical Critical Care, Department of Surgery, University of Washington/ Harborview Medical Center, Seattle, WA, USA

Tammy Noren, PT, MSPT
Assistant Chief Physical Therapist, Department of Rehabilitation Medicine, NewYork-Presbyterian Hospital, Weill Cornell Medical Center, New York, NY, USA

Jeffrey A. Norton, MD
Robert L. and Mary Ellenburg Professor, Department of Surgery, Chief, Divisions of Surgical Oncology and General Surgery, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Michael W. O’Dell, MD
Acting Chief and Professor, Department of Rehabilitation Medicine, New York, NY, USA

Steven M. Opal, MD
Professor, Infectious Disease Division, Department of Medicine, Brown Medical School, Providence, RI, USA

Theodore N. Pappas, MD
Professor and Vice President, Department of Administration and Surgery; Executive Medical Director, Private Diagnostic Clinic, Duke University Medical Center, Durham, NC, USA

Helen A. Pass, MD
Assistant Professor, Department of Clinical Surgery, Columbia University; Assistant Attending Surgeon, NewYork-Presbyterian Hospital/Columbia University Medical Center, New York, NY, USA

Sheela T. Patel, MD
Resident, Department of Surgery, Weill Cornell Medical College, Columbia University College of Physicians and Surgeons, New York, NY, USA

G. Alexander Patterson, MD
Joseph C. Bancroft Professor, Department of Surgery; Chief, Division of Cardiothoracic Surgery, Department of General Thoracic Surgery, Washington University School of Medicine, St. Louis, MO, USA

John F. Perry, Jr., MD
Professor, Department of Surgery, University of Minnesota, Minneapolis, MN, USA

David A. Peterson, MD
Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

John E. Phay, MD
Assistant Professor, Divisions of Surgical Oncology, Department of Surgery, Vanderbilt University Medical Center, Nashville, TN, USA

Edward H. Phillips, MD
Director, Center for Minimally Invasive Surgery, Department of Surgery, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Peter W.T. Pisters, MD
Professor, Department of Surgical Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, TX, USA

Joseph C. Presti, Jr., MD
Associate Clinical Professor, Department of Urology, University of California, San Francisco, San Francisco, CA, USA
Janet S. Rader, MD
Professor, Division of Gynecologic Oncology, Department of Obstetrics and Gynecology; Associate Professor, Department of Genetics, Washington University School of Medicine, St. Louis, MO, USA

Michael D. Rollins, MD
Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Bruce R. Rosengard, MD
Associate Professor, Department of Surgery, Cardiac Surgical Unit, Massachusetts General Hospital, Boston, MA, USA

Todd K. Rosengart, MD
Chief, Cardiothoracic Surgery, Co-Director of the Heart Center at Stony Brook, Stony Brook University, Stony Brook, NY, USA

Michael F. Rotondo, MD
Professor, Chairman, Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC, USA

Grace S. Rozycki, MD, MBA
Professor, Department of Surgery, Director, Trauma and Surgical Critical Care, Emory University School of Medicine, Grady Memorial Hospital, Atlanta, GA, USA

Ira M. Rutkow, MD
Clinical Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Newark, NJ, USA

Stuart D. Saal, MD
Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Vice President for Hospital Affairs; Medical Director, Transplantation Program; Co-Director, Renal Consultation Service; Co-Director, Apheresis, The Rogosin Institute, New York, NY, USA

Courtney Scaife, MD
Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Thomas M. Scalea, MD
Physician-in-Chief, R Adams Cowley Shock Trauma Center; Director, Program in Trauma, University of Maryland School of Medicine, Baltimore, MD, USA

William P. Schecter, MD
Professor, Department Clinical Surgery, University of California, San Francisco, University of California, San Francisco, San Francisco, CA, USA

Matthew J. Schuchert, MD
Instructor, Department of Surgery, University of Pittsburgh, Pittsburgh, PA, USA

Daniel J. Scott, MD
Associate Professor and William Henderson Chair, Director, Tulane Center for Minimally Invasive Surgery, Tulane University School of Medicine, New Orleans, LA, USA

Bilal Shafi, MD, MSE
Surgical Innovation Fellow, Departments of Surgery and Cardiovascular Medicine, Stanford University, Palo Alto, CA, USA

Michael B. Shapiro, MD
Associate Professor, Department of Surgery, Trauma and Critical Care, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

Andrew A. Shelton, MD
Assistant Professor, Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA
CONTRIBUTORS

G. Tom Shires, MD
Professor, Department of Surgery, University of Nevada School of Medicine, Las Vegas, NV, USA

Craig L. Slingluff, Jr., MD
Joseph Helms Farrow Professor, Department of Surgery, University of Virginia, Charlottesville, VA, USA

C. Daniel Smith, MD
Professor and Chair, Department of Surgery, Mayo Clinic Jacksonville, Jacksonville, FL, USA

Mark A. Socinski, MD
Associate Professor, Department of Medicine, Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, NC, USA

Vernon K. Sondak, MD
Chief, Division of Cutaneous Oncology; Professor, Departments of Surgery and Interdisciplinary Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

David Soybel, MD
Senior Staff Surgeon, Division of General and Gastrointestinal Surgery, Brigham and Women's Hospital, Brigham and Women's Hospital, Division of General and Gastrointestinal Surgery, Boston, MA, USA

Philip Starr, MD, PhD
Associate Professor, Dolores Cakebread Endowed Chair, Co-Director, Functional Neurosurgery Program, Department of Neurological Surgery, University of California, San Francisco; Surgical Director, Parkinson's Disease Research, Education and Care Center (PADRECC) at San Francisco Veteran's Affairs Medical Center, San Francisco, CA, USA

Thomas E. Starzl, MD, PhD
Professor, Department of Surgery, Thomas E. Starzl Transplantation Institute, University of Pittsburgh, Pittsburgh, PA, USA

Deborah M. Stein, MD, MPH
Assistant Professor, Department of Surgery, R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine, Baltimore, MD, USA

Larry W. Stephenson, MD
Ford-Webber Professor, Department of Surgery; Professor and Chief, Cardiothoracic Surgery, Wayne State University, School of Medicine, Detroit, MI, USA

Catherine Sudarshan, FRAS
Attending, Cardiothoracic Division, Papworth Hospital, Cambridge, United Kingdom

Benjamin C. Sun, MD
Associate Professor and Director, Departments of Cardiac Transplantation and Mechanical Support and Surgery, The Ohio State University Medical Center, Columbus, OH, USA

Thoralf M. Sundt, MD
Professor, Department of Surgery, Mayo Clinic, Rochester, MN, USA

Jimmy C. Sung, MD, JD
Senior Resident, Department of Surgery, University of South Florida, Tampa, FL, USA

Jeffrey J. Sussman, MD
Assistant Professor, Department of Surgery, University of Cincinnati/VAMC Cincinnati, Cincinnati, OH, USA

J. Richard Thistlethwaite, MD, PhD
Professor, Department of Surgery; President, Medical Staff, The University of Chicago Medical Center, Chicago, IL, USA

'Deceased
Jesse E. Thompson, MD
Professor, Department of Surgery, Baylor University Medical Center, Dallas, TX, USA

Robert W. Thompson, MD
Professor, Departments of Surgery [Section of Vascular Surgery], Radiology, and Cell Biology and Physiology; Vice-Chairman for Research, Department of Surgery; Attending Surgeon, Barnes-Jewish Hospital and Washington University School of Medicine, St. Louis, MO, USA

Bryan W. Tillman, MD, PhD
Assistant Instructor, Department of Surgery, Wake Forest University Medical Center, Winston-Salem, NC, USA

Joseph D. Tobias, MD
Vice-Chairman, Department of Anesthesiology; Russell and Mary Shelden Chair, Department of Pediatric Intensive Care; Chief, Division of Pediatric Anesthesiology; Professor, Department of Pediatrics and Anesthesiology, University of Missouri, Columbia, MO, USA

J.E. Tuttle-Newhall, MD
Assistant Professor, Department of Surgery, Duke University, Durham, NC, USA

Robert Udelsman, MD, MBA
Professor and Chairman, Department of Surgery, Yale University School of Medicine, New Haven, CT, USA

Tom van der Poll, MD, PhD
Professor, Laboratory of Experimental Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Madhulika G. Varma, MD
Attending, UCSF Center for Colorectal Surgery, University of California, San Francisco, Medical Center, San Francisco, CA, USA

Malica Vukovic, MD
Instructor, Department of Medicine, Evanston Hospital, Evanston, IL, USA

James Wall, MD
Resident, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA

Russell Wall, MD
Director, Resident Education, Department of Anesthesia, Georgetown University, Washington, DC, USA

Olivia Walton, PA-C
Physicians Assistant, Department of Anesthesiology, University of Utah, Huntsman Cancer Institute, Salt Lake City, UT, USA

John C.L. Wang, MD, PhD
Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Vice President for Out-Patient Services; Director, Jack J. Dreyfus Clinic of Rogosin Kidney Center; Director, Adoptive Immunotherapy Program; Director, Nephrology; Co-Director, Renal Consultation Service, The Rogosin Institute, New York, NY, USA

Ronald J. Weigel, MD, PhD
Professor and Head, Department of Surgery, University of Iowa Roy J. and Lucille A. Carver College of Medicine and University of Iowa Hospitals and Clinics, Iowa City, IA, USA

Sharon M. Weinstein, MD
Associate Professor, Department of Anesthesiology, University of Utah, Huntsman Cancer Institute, Salt Lake City, UT, USA

Mark L. Welton, MD
Associate Professor, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA
Michael A. West, MD, PhD
Professor, Department of Surgery, Trauma/Critical Care, Northwestern University, Feinberg School of Medicine, Chicago, IL, USA

Brad A. Winterstein, MD
Assistant Professor, Department of Surgery, University of Nebraska Medical Center and the Methodist Hospital, Omaha, NE, USA

Susannah S. Wise, MD
Instructor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Russell K. Woo, MD
General Surgery Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Amy D. Wyrzykowski, MD
Assistant Professor, Department of Surgery, Emory University School of Medicine, Grady Memorial Hospital, Atlanta, GA, USA

Marineh Yagubian, MD
Resident, Department of Surgery, Mayo Clinic, Rochester, MN, USA

Timothy J. Yeatman, MD
Associate Center Director, Department of Clinical Investigations; Professor, Department of Interdisciplinary Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

Roger W. Yurt, MD
Johnson and Johnson Distinguished Professor and Vice Chairman, Department of Surgery; Director, William Randolph Hearst Burn Center, Weill Cornell Medical College, New York-Presbyterian Hospital, New York, NY, USA
Evidence-Based Tables

All evidence-based tables are indicated in the text by an

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Perioperative and Early Feeding Studies with Substantial Number of Well-Nourished or Moderately Malnourished Patients</td>
<td>114</td>
</tr>
<tr>
<td>6.2</td>
<td>Enteral Versus Parenteral or Delayed Feeding in Trauma Patients</td>
<td>115</td>
</tr>
<tr>
<td>6.3</td>
<td>Enteral Versus Parenteral or Other Therapy in General Surgical Patients</td>
<td>116</td>
</tr>
<tr>
<td>6.4</td>
<td>Immune-Enhancing Diets Versus Standard Diet</td>
<td>119</td>
</tr>
<tr>
<td>6.5</td>
<td>Carbohydrate Versus Lipid as Primary Nonprotein Caloric Source</td>
<td>121</td>
</tr>
<tr>
<td>8.1</td>
<td>Summary of Randomized Controlled Trials on the Efficacy and Safety of Low Molecular Weight Heparin in the Prevention of Postoperative Venous Thromboembolism in Patients Undergoing General Surgery, Major Orthopedic Surgery (Total Hip Replacement and Total Knee Replacement), and Trauma Surgery (Level I Evidence)</td>
<td>152</td>
</tr>
<tr>
<td>9.5</td>
<td>Indications for Cryoprecipitate</td>
<td>170</td>
</tr>
<tr>
<td>9.6</td>
<td>Results of Epidemiological Studies on Anemia and Blood Transfusion in Critical Care</td>
<td>172</td>
</tr>
<tr>
<td>12.1</td>
<td>Recent Prospective Trials of Antibiotic Therapy for Complicated Skin and Skin Structure Infections</td>
<td>241</td>
</tr>
<tr>
<td>12.2</td>
<td>Recent Prospective Trials of Antibiotic Therapy for Complicated Skin and Skin Structure Infections of the Foot in Patients with Diabetes Mellitus</td>
<td>243</td>
</tr>
<tr>
<td>12.11</td>
<td>Systemic Antimicrobial Prophylaxis in Colorectal Surgery: Systematic Review of Randomized Controlled Trials</td>
<td>247</td>
</tr>
<tr>
<td>12.13</td>
<td>Antibiotic Prophylaxis for Reduction of Surgical Site Infection Following Clean Surgery: Two Meta-Analyses</td>
<td>248</td>
</tr>
<tr>
<td>12.14</td>
<td>Meta-Analysis of Measures to Prevent Infection Following Arterial Reconstruction</td>
<td>248</td>
</tr>
<tr>
<td>13.1</td>
<td>Bacteria Isolated from Clinical Intraabdominal Infection (% of Patients in Whom a Particular Organism Was Recovered)</td>
<td>260</td>
</tr>
<tr>
<td>13.3</td>
<td>Adjunctive (Nonantibiotic) Measures to Prevent Infection</td>
<td>262</td>
</tr>
<tr>
<td>13.4</td>
<td>Use of Perioperative Antibiotic Prophylaxis</td>
<td>264</td>
</tr>
<tr>
<td>13.5</td>
<td>Open Appendectomy (OA) Versus Laparoscopic Appendectomy (LA) for Acute Appendicitis</td>
<td>265</td>
</tr>
<tr>
<td>13.6</td>
<td>Single-Stage Versus Two-Stage Operation for Complicated Acute Diverticulitis</td>
<td>266</td>
</tr>
<tr>
<td>13.7</td>
<td>Antibiotics for Abdominal Trauma</td>
<td>268</td>
</tr>
<tr>
<td>17.4</td>
<td>Guidelines to Perioperative Cardiovascular Evaluation of Noncardiac Surgery</td>
<td>330</td>
</tr>
</tbody>
</table>
TABLE 17.5. Evidence-Based Pulmonary Risk Stratification for Noncardiothoracic Surgery .................................................. 331
TABLE 17.6. Evidence-Based Strategies to Reduce Pulmonary Risk for Noncardiothoracic Surgery .................................................. 332
TABLE 17.9. Summary of Evidence-Based Guidelines for Prevention of Venous Thromboembolic Disease in Surgical Patients from Fifth American College of Chest Physicians Consensus Conference on Antithrombotic Therapy, 1998 .................................................. 333
TABLE 17.13. Summary of Evidence-Based Guidelines for Red Blood Cell Transfusions for Acute Blood Loss .................................................. 338
TABLE 17.17. Evidence-Based Practice Management Guideline for the Evaluation of Fever in Critically Ill Adult Patients .................................................. 344
TABLE 17.18. Summary of Evidence-Based Clinical Guidelines for the Prevention of Nosocomial Bacterial Pneumonia .................................................. 346
TABLE 19.2. Preoperative Versus Postoperative Analgesia .................................................. 384
TABLE 19.3. Local Infusion Pump Versus Systemic Opioids .................................................. 386
TABLE 19.4. Minimally Invasive Surgery Versus Open Surgery .................................................. 387
TABLE 19.7. Epidural Versus Intravenous Opioid Postoperative Analgesia .................................................. 389
TABLE 22.5. Evidence for Utility of Pulmonary Artery Catheter in Perioperative Patients .................................................. 417
TABLE 22.6. Evidence for Utility of Pulmonary Artery Catheter in Monitoring Critically Ill Patients .................................................. 418
TABLE 25.2. Management of Inhalation Injury .................................................. 450
TABLE 25.4. Burn Shock Resuscitation .................................................. 451
TABLE 25.7. Reports on Mortality in Patients with Thermal Injury in the Past Decade .................................................. 456
TABLE 27.1. Representative Clinical Experience with CT Scan for the Diagnosis of Penetrating Torso Trauma .................................................. 474
TABLE 27.2. Representative Clinical Experience with CT Scan for the Diagnosis of Blunt Chest Trauma .................................................. 478
TABLE 27.3. Representative Clinical Experience with CT Scan for the Diagnosis of Blunt Abdominal Trauma .................................................. 480
TABLE 27.4. Representative Clinical Experience with Ultrasound for the Diagnosis of Torso Trauma .................................................. 482
TABLE 27.5. Representative Clinical Experience with Nonoperative Management of Blunt Hepatic Injuries .................................................. 487
TABLE 27.6. Representative Clinical Experience with Nonoperative Management of Blunt Splenic Injuries .................................................. 490
TABLE 28.2. Therapeutic Angiographic Embolization .................................................. 509
TABLE 28.4. Prospective Evaluation of the Effect of a Damage Control Approach Versus Early Intramedullary Nailing .................................................. 512
TABLE 28.5. Plate Fixation to Reamed Intramedullary Nailing in Chest Injury .................................................. 514
TABLE 28.6. Early Fracture Stabilization and Worse Neurological Outcomes .................................................. 515
TABLE 28.7. Early Fixation of Fractures in the Brain-Injured Patient with Good Outcomes .................................................. 516
### TABLE 31.3
Published Reports of Studies of Corticosteroids in the Management of Patients with Sepsis/Systemic Inflammatory Response Syndrome (SIRS)/MODS. All Studies Were Prospective, Randomized Trials (Class 1 Evidence) ........................................... 569

### TABLE 31.4
Five Randomized, Prospective Trials that Studied Lower Tidal Volumes Versus Conventional Tidal Volumes in Patients Requiring Ventilator Support .................................................. 569

### TABLE 31.5
Studies Designed to Neutralize or Bind Endotoxin in the Management of Patients with Sepsis, Septic Shock, and Organ Failure ................................................................. 571

### TABLE 31.6
Clinical Trials that Have Attempted to Block or Modulate the Vasoactive Phase (Phase I) of the Systemic Inflammatory Response. All Interventions Were Prospective and Placebo-Controlled ........................................ 572

### TABLE 31.7
Platelet-Activating Factor (PAF) .................................................. 572

### TABLE 31.8
Clinical Trials that Have Attempted to Modulate the Cytokine Response of Phase 2 of the Inflammatory Response. All Trials Were Prospective and Placebo Controlled (Class 1 Evidence) in Patients with the Clinical Diagnosis of Sepsis ........................................... 573

### TABLE 32.3
Major Contemporary Trials Comparing Ventilator Weaning Modes ................ 583

### TABLE 32.6
Overview of Ventilatory Strategies for Acute Lung Injury and the Acute Respiratory Distress Syndrome ................................................................. 589

### TABLE 32.7
Summary of Randomized Trials of Low Tidal Volume Ventilatory Strategies in Treatment of Adult Patients with ALI/ARDS ................................................................. 590

### TABLE 33.9
Prospective Trials of Renal Replacement Therapy for Acute Renal Failure ........ 609

### TABLE 34.3
Intraabdominal Pressure (IAP) Effects on the Cardiovascular System ........... 617

### TABLE 34.4
Intraabdominal Pressure Effects on the Pulmonary System ....................... 618

### TABLE 34.5
Intraabdominal Pressure Effects on the Renal System ............................ 618

### TABLE 34.6
IAP Effects on the Splanchnic Circulation ........................................ 619

### TABLE 34.7
Effect of IAP on Intracranial Pressure (ICP) .................................... 620

### TABLE 34.8
IAP Effect on Abdominal Wall .................................................. 620

### TABLE 34.9
IAP Effect on Endocrine and Cytokine Function .................................... 621

### TABLE 35.4
Selected Evidence-Based Trials for Medications Management in Acquired Brain Injury ................................................................. 637

### TABLE 36.12
Large (More Than 100 patients) Published Series of Pediatric Laparoscopic Fundoplication for Gastroesophageal Reflux Disease (GERD) .................................................. 667

### TABLE 36.13
Published Data Comparing Laparotomy (LAP) to Primary Peritoneal Drainage (PPD) for the Treatment of Perforated Necrotizing Enterocolitis (NEC) .................................................. 674

### TABLE 36.21
Prospective Randomized Clinical Trials in Fetal Surgery for Severe Congenital Diaphragmatic Hernia ................................................................. 693

### TABLE 38.1
Comparative Surgical Trials, 1977–1989 ........................................... 712

### TABLE 38.2
Comparative Surgical Trials, 1989–2006 ........................................... 712

### TABLE 38.3
Medical Versus Surgical Treatment of Obesity .................................... 712

### TABLE 38.8
Cost-Effectiveness of Bariatric Surgery ........................................... 718

### TABLE 38.10
Gastric Bypass Techniques .................................................. 720

### TABLE 38.11
Gastric Bypass Practice Patterns .................................................. 720

### TABLE 38.12
Adjustable Gastric Banding Technique Trials .................................... 721
<table>
<thead>
<tr>
<th>Table Number</th>
<th>Table Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE 38.13</td>
<td>Sleeve Gastrectomy Trials</td>
<td>722</td>
</tr>
<tr>
<td>TABLE 38.14</td>
<td>Intragastric Balloon Trials</td>
<td>722</td>
</tr>
<tr>
<td>TABLE 38.15</td>
<td>Pacing Trials</td>
<td>722</td>
</tr>
<tr>
<td>TABLE 39.3</td>
<td>Reported Cases of Laparoscopic Biliary Tract Surgeries During Pregnancy</td>
<td>733</td>
</tr>
<tr>
<td>TABLE 39.4</td>
<td>Reported Cases of Laparoscopic Appendectomy During Pregnancy Trimesters</td>
<td>734</td>
</tr>
<tr>
<td>TABLE 43.3</td>
<td>Prospective Clinical Studies [Level II Evidence] of Hemodynamic Responses to Carbon Dioxide Pneumoperitoneum in Healthy Adults Compared to a Control Group Postinduction</td>
<td>774</td>
</tr>
<tr>
<td>TABLE 43.4</td>
<td>Prospective Clinical Studies [Level II Evidence] of Hemodynamic Responses to Carbon Dioxide Pneumoperitoneum in Adults with Cardiopulmonary Disease</td>
<td>775</td>
</tr>
<tr>
<td>TABLE 43.5</td>
<td>Randomized Controlled Animal Studies [Level I Evidence] of Hemodynamic Responses to Laparoscopy Compared to Postinduction Control</td>
<td>776</td>
</tr>
<tr>
<td>TABLE 43.6</td>
<td>Level II Human Studies on the Metabolic and Immune Responses to Laparoscopic Versus Open Cholecystectomy</td>
<td>781</td>
</tr>
<tr>
<td>TABLE 43.7</td>
<td>Vascular and Bowel Injuries During 77,604 Laparoscopic Cholecystectomies [Level III Evidence]</td>
<td>783</td>
</tr>
<tr>
<td>TABLE 44A.8</td>
<td>Selective Review of Cited Experiences Using &gt;80U Botulinum Toxin (Botox) for Treatment of Adults with Achalasia [Studies with 20 or More Subjects]</td>
<td>800</td>
</tr>
<tr>
<td>TABLE 44A.9</td>
<td>Review of Cited Experience with Operative Myotomy After Prior Endoscopic Therapy</td>
<td>801</td>
</tr>
<tr>
<td>TABLE 44A.10</td>
<td>Review of Cited Experience Using Balloon Dilation Versus Operative Myotomy for Treatment of Achalasia</td>
<td>801</td>
</tr>
<tr>
<td>TABLE 44A.11</td>
<td>Review of Studies Evaluating Antireflux Procedure After Heller Myotomy [&gt;20 patients, &gt;12 month follow-up]</td>
<td>803</td>
</tr>
<tr>
<td>TABLE 44A.15</td>
<td>Summary of Results in Managing Pharyngoesophageal Diverticula</td>
<td>805</td>
</tr>
<tr>
<td>TABLE 44A.17</td>
<td>Healing Rates of Esophagitis: PPI Versus H2-RA</td>
<td>808</td>
</tr>
<tr>
<td>TABLE 44A.18</td>
<td>Review of Cited Reports of Surgical Revision After Failed Fundoplication</td>
<td>812</td>
</tr>
<tr>
<td>TABLE 44A.19</td>
<td>Cited Cohort Studies Evaluating Endoscopic Endoluminal Therapies</td>
<td>813</td>
</tr>
<tr>
<td>TABLE 44A.20</td>
<td>Cited Randomized Controlled Sham Trials Regarding Endoscopic Endoluminal Therapy for Gastroesophageal Reflux</td>
<td>813</td>
</tr>
<tr>
<td>TABLE 44A.22</td>
<td>Medical Versus Surgical Treatment of Barrett’s Esophagus</td>
<td>814</td>
</tr>
<tr>
<td>TABLE 44A.23</td>
<td>Antireflux Surgery and Regression of Barrett’s Esophagus</td>
<td>815</td>
</tr>
<tr>
<td>TABLE 44A.24</td>
<td>Antireflux Surgery and Progression of Barrett’s to Dysplasia or Adenocarcinoma</td>
<td>815</td>
</tr>
<tr>
<td>TABLE 44B.4</td>
<td>Operative Mortality, Morbidity, and Survival for Esophagectomy for Cancer.</td>
<td>829</td>
</tr>
<tr>
<td>TABLE 44B.5</td>
<td>Morbidity of Esophagectomy for Cancer.</td>
<td>829</td>
</tr>
<tr>
<td>TABLE 44B.8</td>
<td>Randomized Trials of Preoperative Chemotherapy Versus Surgery Alone</td>
<td>833</td>
</tr>
<tr>
<td>TABLE 44B.9</td>
<td>Randomized Trials of Neoadjuvant Chemoradiation and Surgery Versus Surgery Alone</td>
<td>835</td>
</tr>
<tr>
<td>TABLE 44B.10</td>
<td>Comparison of Treatment Alternatives by Meta-analyses</td>
<td>836</td>
</tr>
<tr>
<td>TABLE 44B.7</td>
<td>Randomized, Double-Blinded, Placebo-Controlled, Crossover Trials</td>
<td>857</td>
</tr>
<tr>
<td>TABLE 44B.11</td>
<td>Randomized, Double-Blinded, Placebo-Controlled, Crossover Trials</td>
<td>857</td>
</tr>
<tr>
<td>TABLE 45.7</td>
<td>Randomized, Double-Blinded, Placebo-Controlled, Crossover Trials</td>
<td>857</td>
</tr>
<tr>
<td>TABLE 45.8</td>
<td>Randomized, Double-Blinded, Placebo-Controlled, Crossover Trials</td>
<td>857</td>
</tr>
</tbody>
</table>
TABLE 45.11. Comparison of 5-Year Survival from the Dutch Study to American and Japanese Results ........................................... 863
TABLE 45.12. Reconstructive Options Following Distal Gastrectomy [Level I Evidence] ................................................................. 864
TABLE 45.13. Reconstructive Options Following Total Gastrectomy [Level I Evidence] ................................................................. 864
TABLE 46.7. Randomized, Controlled Clinical Trials of Early Endoscopic Sphincterotomy in Gallstone Pancreatitis .................. 884
TABLE 46.9. Randomized, Controlled Clinical Trials of Prophylactic Antibiotic Therapy in Necrotizing Pancreatitis .................... 885
TABLE 46.10. Results of Longitudinal Pancreaticojejunostomy for Chronic Pancreatitis ............................................................... 889
TABLE 46.11. Results of Pancreatic Resection for Chronic Pancreatitis ................................................................. 890
TABLE 46.12. Randomized, Controlled Clinical Trials Comparing Pylorus-Preserving Pancreaticoduodenectomy (PPPD) Versus Standard Whipple Procedure for Pancreatic Cancer ........................................... 897
TABLE 46.14. Randomized, Controlled Trials of Adjuvant Therapy Following Potentially Curative Pancreaticoduodenectomy for Pancreatic Adenocarcinoma ........................................... 898
TABLE 46.15. Survival Following Pancreaticoduodenectomy for Pancreatic Adenocarcinoma: Recent Trials ........................................... 900
TABLE 47.4. Clinical Trials Comparing Early Versus Delayed Surgery for Acute Cholecystitis ............................................................. 924
TABLE 47.9. Global Results of Laparoscopic Cholecystectomy ................................................................. 933
TABLE 47.16. Results of Aggressive Surgical Resection of Hilar Cholangiocarcinoma (1996–1998) ......................................................... 938
TABLE 48.5. Review of Regional Therapies for Hepatic Neoplasms .............................................................................................. 952
TABLE 49.3. Success Rates for Standard (Short) Versus Long Intestinal Tubes in Patients with Small-Bowel Obstruction ........................................... 971
TABLE 50.6. Advantages of Laparoscopic Versus Conventional Open Appendectomy ................................................................. 1004
TABLE 51.3. Results After Strictureplasty ................................................................. 1023
TABLE 51.11. Impact of Fecal Occult Blood Testing on Mortality from Colorectal Malignancy ............................................................... 1052
TABLE 51.12. Impact of Sigmoidoscopy on Mortality from Colorectal Malignancy ................................................................. 1052
TABLE 51.20. Results for Selected Recent Series of Local Excision of Rectal Cancer Alone with Intent to Cure ......................................................... 1066
TABLE 51.21. Results for Selected Recent Series of Local Excision of Rectal Cancer with Postoperative Adjuvant Therapy ......................................................... 1067
TABLE 51.22. Results of Randomized Trials of Preoperative Radiotherapy (Level I Evidence) ................................................................. 1071
TABLE 51.23. Results of Randomized Trials of Postoperative Radiotherapy (Level I Evidence) ................................................................. 1071
TABLE 51.24. Results of Randomized Trials of Combined Chemoradiation (Level I Evidence) ................................................................. 1072
TABLE 51.28. Results for Sigmoid Resection with Rectopexy for Rectal Prolapse ................................................................. 1090
TABLE 51.29. Results of the Delorme Procedure for Rectal Prolapse ................................................................. 1091
| TABLE 51.30. | Results for the Altermeier Procedure for Rectal Prolapse | 1092 |
| TABLE 52.5. | Adult Matched Retrospective Studies of Laparoscopic Versus Open Splenectomy for Disease [Level II Evidence] | 1123 |
| TABLE 52.6. | Adult Nonmatched Retrospective Studies | 1124 |
| TABLE 52.7. | Nonmatched Retrospective Study of Laparoscopic Splenectomy for Idiopathic Thrombocytopenia Purpura [LSI] Versus Laparoscopic Splenectomy for Other Diseases [LSO] [Level III Evidence] | 1124 |
| TABLE 52.8. | Adult Matched Retrospective Study of Laparoscopic Versus Open Splenectomy for Idiopathic Thrombocytopenia Purpura [Level II Evidence] | 1124 |
| TABLE 52.9. | Adult Nonmatched Retrospective Studies of Laparoscopic Versus Open Splenectomy for Disease [Level III Evidence] | 1124 |
| TABLE 52.10. | Pediatric Matched Retrospective Study of Laparoscopic Versus Open Splenectomy for Disease [Level II Evidence] | 1125 |
| TABLE 52.11. | Pediatric Nonmatched Retrospective Study of Laparoscopic Versus Open Splenectomy for Disease [Level III Evidence] | 1126 |
| TABLE 52.12. | Nonmatched Retrospective Study of Laparoscopic Versus Open Splenectomy for Spleenomegaly [Level III Evidence] | 1126 |
| TABLE 52.13. | Nonmatched Retrospective Studies of Laparoscopy Performed for Benign and Malignant Diseases [Level III Evidence] | 1127 |
| TABLE 53.4. | Select Prospective Randomized Trials Comparing Laparoscopic and Open Inguinal Hernia Repairs [Level I Evidence] | 1149 |
| TABLE 53.5. | Trials Comparing Different Types of Laparoscopic Repairs | 1155 |
| TABLE 53.6. | Trials Comparing Laparoscopic and Open Ventral Hernia Repairs | 1166 |
| TABLE 53.7. | Cohort Trials for Laparoscopic Ventral Hernia Repair | 1169 |
| TABLE 55.2. | Imaging Modalities Before Initial Operations for Primary Hyperparathyroidism [PHPT] | 1193 |
| TABLE 55.3. | Imaging Modalities in Reoperative Parathyroidectomies: Overall Results | 1195 |
| TABLE 55.6. | Overall Results of Initial Operations for Primary Hyperparathyroidism | 1199 |
| TABLE 55.7. | Surgical Outcome for Reoperative Surgery | 1202 |
| TABLE 55.9. | Overall Results of Initial Operations for Secondary Hyperparathyroidism | 1203 |
| TABLE 56.3. | Proponents Supporting Less Than Total Thyroidectomy [Level II Evidence] | 1219 |
| TABLE 56.4. | Proponents Supporting Total Thyroidectomy [Level II Evidence] | 1220 |
| TABLE 57.12. | Laparoscopic Versus Open Adrenalectomy | 1242 |
| TABLE 58.6. | Outcome of Various Preoperative Localization Studies for Neuroendocrine Tumors | 1257 |
| TABLE 58.9. | Outcome of Surgical Management of Insulinoma and Gastrinoma and Survival After Gastrinoma Resection | 1263 |
| TABLE 58.11. | Incidence, Metastatic Disease, and 5-Year Survival for Carcinoid Tumors at Different Anatomic Sites | 1275 |
| TABLE 59.5. | Development of a Contralateral Pheochromocytoma After Unilateral Adrenalectomy [Level II Evidence] | 1292 |
| TABLE 59.6. | Results of Operation for Hyperparathyroidism in Patients with MEN 2A [Level II Evidence] | 1293 |
| TABLE 60.1. | First Carotid Reconstructions for Cerebrovascular Insufficiency in Chronological Order | 1309 |
| TABLE 61.1. | Primary Prevention of Atherosclerosis in High Risk Patients [Level I Evidence] | 1323 |
TABLE 61.2. Secondary Prevention of Atherosclerosis in Patients with Established Atherosclerotic Vascular Disease (Level 1 Evidence) ........................................... 1323
TABLE 62.1. Influence of the Technique of Carotid Endarterectomy on Rates of Perioperative Stroke/Death and Restenosis .............................................. 1343
TABLE 62.2. Influence of Anesthetic Technique on Perioperative Complications in Patients Undergoing CEA ................................................................. 1344
TABLE 62.3. Influence of Method of Arteriotomy Closure on Perioperative Complications and Restenosis in Patients Undergoing CEA ........................................... 1346
TABLE 62.4. Series of Carotid Angioplasty and Stenting (Level II Evidence) ................. 1348
TABLE 63.1. Management of Acute Aortic Syndromes ............................................... 1362
TABLE 63.2. Prevention of Spinal Cord Infarction During Thoracic and Thoracoabdominal Aortic Aneurysm Repair ......................................................... 1368
TABLE 64.1. Results of Innominate Artery Reconstruction (Level III Evidence) .............. 1377
TABLE 64.2. Results for Transaxillary First Rib Resection (Level III Evidence) .......... 1392
TABLE 64.3. Results for Supraclavicular Scalenectomy/First Rib Resection (Level III Evidence) .............................................................. 1393
TABLE 65.1. Randomized Controlled Trials of Ultrasound Screening for Abdominal Aortic Aneurysm (AAA) ................................................................. 1398
TABLE 65.2. Randomized Controlled Trials of AAA Intervention ................................... 1399
TABLE 65.3. Randomized Trials of Renal Artery Stenosis Treatment Options ............ 1407
TABLE 66.1. Above-Knee Femoropopliteal Grafts ......................................................... 1417
TABLE 66.2. Below-Knee Femoropopliteal Grafts ......................................................... 1417
TABLE 66.3. Infrapopliteal Grafts ............................................................................... 1418
TABLE 66.4. Percutaneous Transluminal Angioplasty Patency ...................................... 1419
TABLE 67.1. Recommendations for Venous Thromboembolism Prophylaxis ............. 1434
TABLE 67.2. PIOPED Central Scan Interpretation Categories and Criteria .............. 1437
TABLE 67.7. Randomized Trials of LMWH versus UFH for Treatment of Deep Venous Thrombosis (DVT) (Level I Evidence) .............................................. 1440
TABLE 68.1. Vascular Access for Hemodialysis: Complication-Free Function (Level III Evidence) ................................................................. 1459
TABLE 68.2. Trials Comparing Surgical to Endovascular Management of Stenosis or Thrombosis of Dialysis Access Grafts ........................................... 1465
TABLE 68.3. Patency Rates of Various Types of Vascular Access for Chronic Hemodialysis (Level III Data) ..................................................................... 1466
TABLE 69.1. First Year of Successful Intracardiac Repairs Using Cardiopulmonary Bypass or Cross-Circulation ......................................................... 1474
TABLE 70.2. Randomized Controlled Trials Examining the Impact of Perioperative Beta-Blockade on Patients with Cardiac Risk Factors ............. 1482
TABLE 70.4. Prospective Randomized Double-Blind Trials Addressing the Use of Prophylactic Antibiotics in Elective Pulmonary Resections .............. 1484
TABLE 70.5. Prospective Randomized Trials Comparing Suction to Water Seal Following Pulmonary Resections ......................................................... 1486
TABLE 70.6. Trials Evaluating Incidence and Prophylaxis for Deep Venous Thrombosis (DVT) in Thoracic Surgery Patients .............................................. 1486
TABLE 70.7. Randomized Trials with Placebo Control for the Prophylactic Use of Medication for the Prevention of Postoperative Atrial Fibrillation in General Thoracic Surgery Patients 1487
TABLE 71.5. Surgery and Adjuvant Radiotherapy .................................................. 1500
TABLE 71.6. Surgery and Platin-Based Chemotherapy ................................. 1502
TABLE 71.7. Surgery and UFT-Based Chemotherapy ................................. 1502
TABLE 71.8. Results of Resection of Patients with T4 Involvement from NSCLC ...... 1504
TABLE 71.9. Results of Traditional Chemoradiotherapy for Stage III NSCLC .......... 1506
TABLE 71.10. Randomized Trial of Sequential Versus Concurrent Chemoradiotherapy for Stage III NSCLC .................. 1506
TABLE 71.12. Randomized Trials of Chemotherapy Versus Basic Supportive Care in Advanced NSCLC .................. 1508
TABLE 73.1. VATS Lobectomy: Morbidity and Mortality .............................. 1536
TABLE 73.2. VATS Lobectomy: Recurrence and Survival ............................. 1537
TABLE 73.3. VATS Lobectomy: Perioperative Outcomes Data .................... 1538
TABLE 73.4. Comparison of Staging Modalities ........................................ 1541
TABLE 73.5. Minimally Invasive Esophagectomy: Surgical Outcomes .......... 1544
TABLE 73.6. Minimally Invasive Esophagectomy: Recurrence and Survival .... 1545
TABLE 75.1. Comparison of Treatment Options for Postoperative Mediastinitis [Retrospective Studies, Level III Evidence] .................. 1574
TABLE 75.8. Prevalence of Thymoma in Patients with Myasthenia Gravis [MG] ........ 1586
TABLE 75.9. Results of Thymectomy for Myasthenia Gravis [Level III Evidence] ...... 1587
TABLE 75.11. Prevalence of Myasthenia Gravis [MG] in Patients with Thymoma .... 1588
TABLE 75.13. Multimodality Treatment for Invasive Thymoma [Phase II Trials, Level II Evidence] .................. 1589
TABLE 75.14. Combination Chemotherapy for Advanced or Recurrent Thymic Tumors [Level II Evidence] .................. 1590
TABLE 77.2. Coronary Artery Bypass Trials .................................................. 1632
TABLE 77.3. CABG Versus Percutaneous Transluminal Coronary Angioplasty (PTCA) Multivessel Disease Trials .................. 1632
TABLE 77.4. CABG Versus Percutaneous Coronary Intervention (PCI) with Stent Trials .................................................. 1633
TABLE 77.5. CABG Versus Medical Treatment ........................................... 1633
TABLE 77.7. Outcomes of CABG Versus PCI ............................................. 1640
TABLE 77.8. Selected Series of Surgical Repair of Free Wall Rupture of LV, LV Pseudoaneurysm, and LV Aneurysm .................................................. 1643
TABLE 77.9. Selected Series of Surgical Repair of Postinfarction Ventricular Septal Defect [VSD] and Acute Mitral Insufficiency .................................................. 1644
TABLE 77.13. Selected Series of Mitral Valve Replacements .......................... 1662
TABLE 77.14. Mitral Valve Repair .......................................................... 1662
TABLE 79.3. Kidney Transplantation with 6 Months or More Survival as of March 1963 .................................................. 1685
TABLE 80.3. Immunosuppression Approaches ............................................. 1723
TABLE 80.4. Results of Recent Tolerance and Minimization Trials .................. 1728
TABLE 80.5. Preclinical Tolerance .......................................................... 1729
TABLE 80.6. Xenotransplantation ............................................................ 1731
TABLE 81.2. Studies of Calcineurin Inhibitor Withdrawal or Avoidance ............ 1738
<table>
<thead>
<tr>
<th>Table Number</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE 81.3</td>
<td>Studies of Alemtuzumab [Campath] for Induction</td>
<td>1739</td>
</tr>
<tr>
<td>TABLE 81.4</td>
<td>Studies of Anti-IL2R [Anti-CD25] Antibodies</td>
<td>1740</td>
</tr>
<tr>
<td>TABLE 81.5</td>
<td>Effects of Positive Flow or B-Cell Crossmatch on Transplant Outcome</td>
<td>1742</td>
</tr>
<tr>
<td>TABLE 82.4</td>
<td>Optimal Cold Ischemia Time for Different Organs Based on Class of Evidence</td>
<td>1752</td>
</tr>
<tr>
<td>TABLE 85.12</td>
<td>Liver Transplantation from Donors After Cardiac Death</td>
<td>1800</td>
</tr>
<tr>
<td>TABLE 85.14</td>
<td>Adult/Adult Split Liver Transplantation</td>
<td>1807</td>
</tr>
<tr>
<td>TABLE 85.15</td>
<td>Routine Use of T Tubes</td>
<td>1809</td>
</tr>
<tr>
<td>TABLE 85.19</td>
<td>Prevention of CMV Disease in Liver Transplant Recipients</td>
<td>1818</td>
</tr>
<tr>
<td>TABLE 86.2</td>
<td>Patient Survival</td>
<td>1833</td>
</tr>
<tr>
<td>TABLE 86.3</td>
<td>Graft Survival</td>
<td>1834</td>
</tr>
<tr>
<td>TABLE 86.5</td>
<td>Nutritional Autonomy</td>
<td>1836</td>
</tr>
<tr>
<td>TABLE 92.3</td>
<td>Phase II Studies Evaluating Tyrosine Kinase Inhibitors in Solid Malignancies</td>
<td>1941</td>
</tr>
<tr>
<td>TABLE 93.3</td>
<td>Responses to High-Dose IL-2 Therapy in Human Trials</td>
<td>1950</td>
</tr>
<tr>
<td>TABLE 94.3</td>
<td>Comparison of Mastectomy and Breast Conservation Therapy for Early-Stage Breast Carcinoma: Prospective Trials</td>
<td>1974</td>
</tr>
<tr>
<td>TABLE 94.4</td>
<td>Effect of Regional Lymph Node Dissection: Prospective Trials</td>
<td>1975</td>
</tr>
<tr>
<td>TABLE 94.5</td>
<td>Comparison of Biliary Decompression Techniques in Cancer Patients</td>
<td>1979</td>
</tr>
<tr>
<td>TABLE 95.2</td>
<td>Randomized Trials of Mastectomy Compared to Breast-Conserving Surgery and Radiotherapy [Level I Evidence]</td>
<td>1988</td>
</tr>
<tr>
<td>TABLE 95.3</td>
<td>Randomized Trials of Breast-Conserving Surgery Compared to Breast-Conserving Therapy and Radiotherapy [Level I Evidence]</td>
<td>1989</td>
</tr>
<tr>
<td>TABLE 95.4</td>
<td>Randomized Trials of Postoperative Adjuvant Radiation and Chemotherapy for Rectal Cancer [Level I Evidence]</td>
<td>1992</td>
</tr>
<tr>
<td>TABLE 95.5</td>
<td>Randomized Trials of Preoperative Adjuvant Radiation for Resectable Rectal Cancer [Level I Evidence]</td>
<td>1993</td>
</tr>
<tr>
<td>TABLE 95.6</td>
<td>Preoperative Radiation and Chemotherapy for Resectable Esophageal Cancer Randomized Trials [Level I Evidence]</td>
<td>1995</td>
</tr>
<tr>
<td>TABLE 95.7</td>
<td>Randomized Trials for Organ Preservation in Head and Neck Cancer</td>
<td>1997</td>
</tr>
<tr>
<td>TABLE 96.7</td>
<td>Randomized Trial of Mastectomy Versus Breast Conservation [Level I Evidence]</td>
<td>2025</td>
</tr>
<tr>
<td>TABLE 96.9</td>
<td>Sentinel Lymph Node (SLN) Mapping Trials</td>
<td>2027</td>
</tr>
<tr>
<td>TABLE 97.4</td>
<td>Current Recommendations for Excision Margins for Cutaneous Melanomas</td>
<td>2045</td>
</tr>
<tr>
<td>TABLE 97.5</td>
<td>Randomized Trials of Elective Node Dissection in Clinically Localized Cutaneous Melanoma [Level I Evidence]</td>
<td>2046</td>
</tr>
<tr>
<td>TABLE 97.6</td>
<td>Published Randomized Trials of Adjuvant Interferon Therapy in Resected Cutaneous Melanoma [Level I Evidence]</td>
<td>2050</td>
</tr>
<tr>
<td>TABLE 98.3</td>
<td>Results of Surgery Alone for Selected Patients with Soft Tissue Sarcoma</td>
<td>2067</td>
</tr>
<tr>
<td>TABLE 98.4</td>
<td>Local Control with Surgery and Radiotherapy for Localized Soft Tissue Sarcoma: Randomized Phase III Trials and Selected Nonrandomized Retrospective Reviews [Level I and Level III Evidence].</td>
<td>2068</td>
</tr>
<tr>
<td>TABLE 98.5</td>
<td>Phase III Trials of Adjuvant Radiotherapy for Localized Extremity and Trunk Sarcomas Stratified by Grade [Level I Evidence]</td>
<td>2068</td>
</tr>
<tr>
<td>Table</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>98.6</td>
<td>Randomized Trials of Adjuvant Chemotherapy Versus Observation in Soft Tissue Sarcoma (Level I Evidence)</td>
<td>2070</td>
</tr>
<tr>
<td>98.7</td>
<td>Sarcoma Meta-Analysis Collaboration Group Meta-Analysis of Randomized Doxorubicin-Based Postoperative Chemotherapy in Soft Tissue Sarcoma</td>
<td>2071</td>
</tr>
<tr>
<td>98.8</td>
<td>Survival Following Complete Resection of Pulmonary Metastases from Soft Tissue Sarcoma in Adults</td>
<td>2075</td>
</tr>
<tr>
<td>98.9</td>
<td>Randomized Phase III Trials with Ifosfamide-Containing Treatment Arms in Advanced Soft Tissue Sarcoma (Level I Evidence)</td>
<td>2077</td>
</tr>
<tr>
<td>98.10</td>
<td>Resectability Rates for Retroperitoneal Sarcomas in Selected Series</td>
<td>2078</td>
</tr>
<tr>
<td>99.1</td>
<td>Trials of Imatinib Mesylate in Metastatic Gastrointestinal Stromal Tumor (GIST)</td>
<td>2089</td>
</tr>
<tr>
<td>99.2</td>
<td>Response Rates to Chemotherapy in Patients with Metastatic GIST (Level III Evidence)</td>
<td>2091</td>
</tr>
<tr>
<td>99.3</td>
<td>Outcome of Complete Surgical Resection of Primary Localized GIST</td>
<td>2093</td>
</tr>
<tr>
<td>100.3</td>
<td>Patterns of Failure in the Department of Veterans Affairs Laryngeal Cancer Group Trial (Level I Evidence)</td>
<td>2103</td>
</tr>
<tr>
<td>100.4</td>
<td>Survival Rates for Larynx Preservation Trials Using Neoadjuvant Chemotherapy (Level I Evidence)</td>
<td>2104</td>
</tr>
<tr>
<td>100.5</td>
<td>Meta-Analysis of Chemotherapy (CT) According to Timing of Chemotherapy</td>
<td>2104</td>
</tr>
<tr>
<td>102.6</td>
<td>Pharmacological Treatments for Weight Loss</td>
<td>2128</td>
</tr>
<tr>
<td>102.10</td>
<td>Prospective, Randomized Trials Involving 20 or More Subjects of Perioperative Specialized Nutrition Support in Cancer Patients (Level I Evidence)</td>
<td>2132</td>
</tr>
<tr>
<td>102.11</td>
<td>Prospective, Randomized Trials Involving 30 or More Subjects of Specialized Nutrition Support in Stem Cell Transplantation</td>
<td>2134</td>
</tr>
<tr>
<td>102.12</td>
<td>Prospective, Randomized Trials Involving 30 or More Subjects of Specialized Nutrition Support in Cancer Patients Undergoing Chemotherapy</td>
<td>2135</td>
</tr>
<tr>
<td>102.14</td>
<td>Prospective, Randomized Trials Involving 20 or More Subjects of Immune-Supplemented Enteral Nutrition Support in Cancer Patients (Level I Evidence)</td>
<td>2138</td>
</tr>
<tr>
<td>103.5</td>
<td>Prospective Randomized Trials of Adjuvant Isolated Limb Perfusion (ILP) for Resected High-Risk Primary or In-Transit Melanoma.</td>
<td>2156</td>
</tr>
<tr>
<td>103.7</td>
<td>Results of ILP Trials Using TNF to Treat In-Transit Melanoma of the Extremity.</td>
<td>2157</td>
</tr>
<tr>
<td>103.8</td>
<td>Response Rates and Limb Salvage in Phase II Trials of ILP to Treat Unresectable Soft Tissue Sarcomas of the Extremity</td>
<td>2158</td>
</tr>
<tr>
<td>103.10</td>
<td>Randomized Trials of Intraarterial Chemotherapy for Colorectal Metastases to the Liver</td>
<td>2161</td>
</tr>
<tr>
<td>103.11</td>
<td>Phase II and III Trials of Adjuvant Intraarterial Chemotherapy After Resection of Colorectal Metastases</td>
<td>2162</td>
</tr>
<tr>
<td>103.12</td>
<td>Results of Clinical Trials with Isolated Hepatic Perfusion for Metastatic Cancers.</td>
<td>2162</td>
</tr>
<tr>
<td>103.13</td>
<td>Phase I/II Trial of Continuous Hyperthermic Peritoneal Perfusion for Advanced Peritoneal Disease</td>
<td>2164</td>
</tr>
<tr>
<td>104.1</td>
<td>Mechanism and Site of Ureteral Injuries</td>
<td>2184</td>
</tr>
<tr>
<td>104.2</td>
<td>Urinalysis and Intravenous Urography in the Diagnosis of Ureteral Injuries</td>
<td>2184</td>
</tr>
<tr>
<td>TABLE 104.4.</td>
<td>Results of Watchful Waiting Series for Prostate Cancer</td>
<td>2188</td>
</tr>
<tr>
<td>TABLE 105.2.</td>
<td>Studies Evaluating Ultrasonography in Pelvic Inflammatory Disease (Level II Evidence)</td>
<td>2201</td>
</tr>
<tr>
<td>TABLE 105.5.</td>
<td>Studies Evaluating the Surgical Approach to Hemodynamically Stable Ectopic Pregnancy (Level I Evidence)</td>
<td>2203</td>
</tr>
<tr>
<td>TABLE 105.6.</td>
<td>Studies Evaluating Radical Versus Conservative Surgical Management of Ectopic Pregnancy (Level II Evidence)</td>
<td>2203</td>
</tr>
<tr>
<td>TABLE 105.8.</td>
<td>Studies Evaluating the Use of Color Doppler Sonography in the Diagnosis and Management of Ovarian Torsion (Level II Evidence)</td>
<td>2205</td>
</tr>
<tr>
<td>TABLE 105.10.</td>
<td>Laparoscopic Management of Suspicious Adnexal Masses (Level II Evidence)</td>
<td>2206</td>
</tr>
<tr>
<td>TABLE 106.2.</td>
<td>Techniques for Controlling Elevated Intracranial Pressure (ICP) (Level II and Level III Evidence)</td>
<td>2220</td>
</tr>
<tr>
<td>TABLE 106.6.</td>
<td>Class I Evidence in Functional Neurosurgery (Epilepsy, Pain, and Movement Disorders)</td>
<td>2230</td>
</tr>
<tr>
<td>TABLE 109.1.</td>
<td>Seminal Studies and Reports Describing the Use of Polypropylene Mesh</td>
<td>2294</td>
</tr>
<tr>
<td>TABLE 109.2.</td>
<td>Seminal Articles Describing the Use of Polyester and Polyester-Derived Meshes</td>
<td>2294</td>
</tr>
<tr>
<td>TABLE 109.3.</td>
<td>Seminal Articles Describing the Use of ePTFE and ePTFE-Derived Meshes</td>
<td>2295</td>
</tr>
<tr>
<td>TABLE 111.2.</td>
<td>Summary of Major Clinical Studies of Porcine Small Intestinal Submucosa (SIS) Used in Herniorrhaphy</td>
<td>2319</td>
</tr>
<tr>
<td>TABLE 111.3.</td>
<td>Summary of Major Clinical Studies of AlloDerm (Acellular Dermal Matrix) Used in Herniorrhaphy</td>
<td>2322</td>
</tr>
<tr>
<td>TABLE 112.2.</td>
<td>Selected Clinical Studies of Vertebroplasty and Balloon Kyphoplasty</td>
<td>2328</td>
</tr>
<tr>
<td>TABLE 112.3.</td>
<td>Selected Clinical Trials for Biogluue™</td>
<td>2331</td>
</tr>
<tr>
<td>TABLE 112.4.</td>
<td>Selected Clinical Trials for Hydrogels</td>
<td>2333</td>
</tr>
<tr>
<td>TABLE 112.5.</td>
<td>Selected Clinical Trials for Fibrin Glues</td>
<td>2335</td>
</tr>
<tr>
<td>TABLE 112.6.</td>
<td>Selected Clinical Trials for Dermal Fillers</td>
<td>2337</td>
</tr>
<tr>
<td>TABLE 112.7.</td>
<td>Selected Clinical Studies of “Miscellaneous Biomaterials”</td>
<td>2339</td>
</tr>
<tr>
<td>TABLE 113.1.</td>
<td>Argon Beam Coagulator (ABC): Studies Supporting Use of the ABC in Tissue Coagulation of Solid Organs</td>
<td>2348</td>
</tr>
<tr>
<td>TABLE 113.2.</td>
<td>Radiofrequency Ablation (RFA) Can Treat Disease as Well as Assisting in Surgical Procedures: Clinical Outcomes Can Be Measured as Shown Here</td>
<td>2349</td>
</tr>
<tr>
<td>TABLE 113.3.</td>
<td>Majority of Bipolar Sealing Data Are from Animal Studies: Similar Results Seen Across Various Platforms</td>
<td>2350</td>
</tr>
<tr>
<td>TABLE 113.4.</td>
<td>Tissue Link: Limited Clinical Studies: In Animals, the Saline-Modulated Electrosurgical Device (SMED) Appears Efficacious in Controlling Vessels Below Organ Surface</td>
<td>2350</td>
</tr>
<tr>
<td>TABLE 113.5.</td>
<td>Results with Harmonic Scalpel Show Equivalence and Superior Results in Some Cases to Electrocautery</td>
<td>2352</td>
</tr>
<tr>
<td>TABLE 114.2.</td>
<td>Clinical Trials Comparing Robot-Assisted Cholecystectomy to Standard Laparoscopy</td>
<td>2360</td>
</tr>
<tr>
<td>TABLE 114.3.</td>
<td>Clinical Trials Comparing Robot-Assisted Nissen Fundoplication to Standard Laparoscopy</td>
<td>2362</td>
</tr>
</tbody>
</table>
TABLE 114.4. Clinical Trials Comparing Robot-Assisted Colon Resection to Standard Laparoscopy ........................................................................................................ 2363
TABLE 114.5. Published Experience with Robot-Assisted Aortic Surgery ............................................. 2367
TABLE 114.6. Pediatric Clinical Experience with the Zeus® and da Vinci® Robotic Systems. .................................................. 2368