Clinical Decision Making in Colorectal Surgery

Scott R. Steele
Justin A. Maykel
Steven D. Wexner
Editors

Second Edition

Springer

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Editors
Scott R. Steele
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, OH
USA

Justin A. Maykel
Department of Surgery
University of Massachusetts
Worcester, MA
USA

Steven D. Wexner
Department of Colorectal Surgery
Cleveland Clinic Florida
Weston, FL
USA

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The first edition of Clinical Decision Making in Colorectal Surgery was dedicated to my dear friends and deeply appreciated philanthropic supporters the Caporella family and their company, the National Beverage Corporation. It is only fitting that 25 years later I again dedicate the second edition to Nick Caporella, Joe Caporella, and the National Beverage Corporation for their three decades of unparalleled support to the research and education activities of the Department of Colorectal Surgery at Cleveland Clinic Florida. Without their shared altruistic vision and tremendous financial commitment to our programs, our department would not be where it is today.

—Steven D. Wexner

Foreword

It is a pleasure and an honor to be asked to write the foreword for the second edition of a book that was initially published in 1995. At the time the book represented a unique approach to a wide variety of colorectal and anal conditions; by providing thoughtful and organized algorithms for each topic, the reader was provided with the essentials required for the evaluation of each entity. To their credit, the editors of the second edition, all of whom are internationally known academic clinicians in the field of colorectal surgery, have realized the value of this format and preserved it in this new iteration.

The authors of each of the chapters are practicing physicians and surgeons who convey a logical clinical approach to the specific problem they are addressing. Many of the contributors are accomplished and respected teachers within their specialty. Individual chapters are brief but sufficient. References are current and supportive of the points made in each chapter while not being overwhelming in number. Under no circumstances should this book be considered an encyclopedic reference textbook; rather, the chapters form a sound basis for more exhaustive reading on any of the presented topics.

It has long been my advice to individuals preparing for the certifying (oral) examination of the American Board of Colon and Rectal Surgery to review each subject and prepare an algorithm that reflects current practice for each of the diseases that we see and treat. The current edition of this book makes the task much easier for the examinee. In fact, with the near doubling of medical information every three months this is a book that should be readily available not just to colorectal surgeons but to anybody who cares for patients with colorectal diseases, since it will provide concise and cogent direction to evaluation and treatment of a broad array of relatively common and uncommon diseases in a rapidly changing landscape. The editors should be congratulated for creating a text that can be so valuable for so many.

David J. Schoetz Jr, MD
Department of Colon and Rectal Surgery
Lahey Hospital and Medical Center
Burlington, MA, USA

Preface

Second Edition Clinical Decision Making

Twenty-five years have elapsed since the publication of the first edition of *Clinical Decision Making in Colorectal Surgery* by Steven D. Wexner and Anthony M. Vernava III. That textbook served many trainees and practicing surgeons quite well for rapid review of the current evaluation and management of individual problem-based questions. The algorithmic approach was found to be very clinically relevant and practical. The combination of clarity, brevity, and references was greatly appreciated. Accordingly, many times during the last 25 years surgeons have asked for second updated edition. Thus, we are delighted to present this long-awaited second edition to the surgical community. The second edition of *Clinical Decision Making in Colorectal Surgery* has added many topics, updated content in every single area, subdivided chapters in which more detailed information has been accumulated, and has in every instance, recruited renowned global leaders in colorectal surgery to share their expertise and present the best evidence-based practice algorithms to readers. We are very proud to present to you this comprehensive volume and deeply appreciate the 183 chapter authors who have expended considerable time and delivered superlative expertise with each assignment. We thank all of our colleagues and friends for their efforts that have culminated in the production of this outstanding volume.

We are both optimistic and confident that you will enjoy and frequently rely upon this algorithmic textbook *Clinical Decision Making in Colorectal Surgery*.

Cleveland, OH — Scott R. Steele
Worcester, MA — Justin A. Maykel
Weston, FL — Steven D. Wexner

Acknowledgments

My sincere gratitude for our incredible, hardworking, and talented Developmental Editor Elektra McDermott. I would also like to thank all the authors for their outstanding content and my co-editors, Steve and Justin, for their insight, skill, and collaboration. Finally, to my family Michele and Marianna as well as Piper and Flynn for their continued patience and support behind the scenes.

Scott R. Steele

I would like to thank the individual authors for their commitment to this textbook and for the time they dedicated to bring our readers the most comprehensive and up-to-date review of the topics. I would also like to thank my co-editors for their leadership and diligence thought the production process. Finally, I would like to thank our patients who provide us with our inspiration.

Justin A. Maykel

I am grateful to Ms. Elektra McDermott for her time and talents as both our development and copy editor. I would like to also thank Debbie Holton for her assistance to the editors at all stages of conception, creation, and production of this volume.

Steven D. Wexner

Contents

Part VIII Complications

Editors and Contributors

Editors

Scott R. Steele, MD, MBA, FACS, FASCRS Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

Justin A. Maykel, MD Division of Colon and Rectal Surgery, Department of Surgery, University of Massachusetts Memorial Medical Center, Worcester, MA, USA

Steven D. Wexner, MD, PhD (Hon), FACS, FRCS (Eng), FRCS (Ed), FRCSI (Hon), Hon FRCS (Glasg) Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, FL, USA

Contributors

Benjamin Abbadessa, MD Department of Surgery, Mount Sinai Beth Israel, New York, NY, USA

Maher A. Abbas, MD, FACS, FACRS Department of Colon and Rectal Surgery, Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

Al-Zahra Hospital - Dubai and King's College Hospital, Dubai, United Arab Emirates

Syed K. Abbas, MD Department of Surgery, Stony Brook University Hospital, Stony Brook, NY, USA

Titilayo O. Adegboyega, MD, MPH Department of Colorectal Surgery, Northwell Health System, Woodbury, NY, USA

Yasir Akmal, MD, FACS Department of Colon and Rectal Surgery, Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

Karim Alavi, MD, MPH, FACS, FASCRS Division of Colon and Rectal Surgery, University of Massachusetts Medical School, Worcester, MA, USA

Ahmed AL-Khamis, MD Division of Colorectal Surgery, Department of Surgery, Icahn School of Medicine at Mount Sinai Hospital, New York, NY, USA

Alison R. Althans, MD Department of Surgery, University of Pittsburgh Medical Center, Pittsburgh, PA, USA

Elizabeth Arcila, MD Department of General Surgery, LAC + UCS Medical Center/Keck Medical Center, Los Angeles, CA, USA

Jean H. Ashburn, MD Division of Colorectal Surgery, Wake Forest University Baptist Medical Center, Winston-Salem, NC, USA

Shmuel Avital, MD Department of Surgery B, Meir Medical Center, Kfar Saba, Israel

H. Hande Aydinli, MD Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

Jennifer Ayscue, MD, FACS, FASCRS MedStar Colorectal Surgery Program, MedStar Washington Hospital Center, Washington, DC, USA

Debbie G. Bakes, MD Division of Colon and Rectal Surgery, Department of Surgery, University of Miami Miller School of Medicine, Miami, FL, USA

Jennifer S. Beaty, FACS, FASCRS Section of Colon and Rectal Surgery, CHI Bergan Mercy Medical Center, Creighton University School of Medicine, Omaha, NE, USA

David E. Beck, MD, FACS, FASCRS Colon and Rectal Surgery, Vanderbilt University, Nashville, TN, USA

Brian L. Bello, MD, FACS Department of Colorectal Surgery Program, MedStar Washington Hospital Center, Washington, DC, USA

Mariana Berho, MD Department of Pathology, Cleveland Clinic Florida, Weston, FL, USA

Mitchell A. Bernstein, MD, FACS, FACSRS Division of Colorectal Surgery, Department of Surgery, New York University Langone Medical Center, New York, NY, USA

Anuradha R. Bhama, MD Division of Colon and Rectal Surgery, Rush University Medical Center, Chicago, IL, USA

Anton J. Bilchik, MD, PhD Department of Surgical Oncology, John Wayne Cancer Institute, Santa Monica, CA, USA

Jason R. Bingham, MD Madigan Healthcare System, Department of General Surgery, Joint Base Lewis-McCord, Tacoma, WA, USA

Joshua I. S. Bleier, MD, FACS, FASCRS Department of Surgery, Penn Perelman School of Medicine, Philadelphia, PA, USA

Robin P. Boushey, MD, PhD, CIP, FRCSC Department of Surgery, The Ottawa Hospital, Ottawa, ON, Canada

Marylise Boutros, MD, MSc Division of Colon and Rectal Surgery, Jewish General Hospital, Montreal, QC, Canada

Matthew T. Brady, MD Department of Surgery, Boston Medical Center/ Boston University School of Medicine, Boston, MA, USA

Daniel I. Chu, MD Division of Gastrointestinal Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA

William C. Cirocco, MD Head, Section of Colon and Rectal Surgery, Banner MD Anderson Cancer Center, Phoenix, AZ, USA

Kyle G. Cologne, MD Division of Colorectal, Department of Surgery, Keck Hospital of USC, Los Angeles, CA, USA

Patrick H. D. Colquhoun, MD, MSc, FRCSC, FASCRS Department of Surgery, London Health Sciences Center University Hospital, London, ON, Canada

Bard C. Cosman, MD, MPH Surgical Services, VA San Diego Healthcare System, University of California School of Medicine, San Diego, CA, USA

Meagan M. Costedio, MD Department of Colorectal Surgery, Ahuja Medical Center of University Hospitals, Beachwood, OH, USA

Bidhan Das, MD, FACS Department of Surgery, McGovern Medical School, The University of Texas Health Science Center at Houston, Houston, TX, USA

Jennifer S. Davids, MD, FACS, FASCRS Department of Surgery, University of Massachusetts Memorial Medical Center, Worcester, MA, USA

Shandra R. Day, MD Division of Infectious Diseases, Department of Internal Medicine, The Ohio State University Wexner Medical Center, Columbus, OH, USA

Conor P. Delaney, MD, MCh, PhD, FRCS Department of Colorectal Surgery, Digestive Disease and Surgery Institute, Cleveland Clinic, Cleveland, OH, USA

Paula I. Denoya, MD Department of Surgery, Stony Brook University Hospital, Stony Brook, NY, USA

Kaitlin Domek, MD Department of Surgery, University of Arkansas for Medical Sciences, Little Rock, AR, USA

Leonardo C. Duraes, MD, PhD Ravitch Colorectal Surgery Division, Johns Hopkins Medical Institute, Baltimore, MD, USA

Christopher R. Dwyer, MD Department of Colon and Rectal Surgery, Indiana University, Indianapolis, IN, USA

Yair Edden, MD Department of General Surgery, Shaare Zedek Medical Center, Jerusalem, Israel

Jonathan E. Efron, MD Department of Surgery, Johns Hopkins Hospital, Baltimore, MD, USA

Alexandra Elias, MD Division of Colon and Rectal Surgery, Mayo Clinic, Jacksonville, FL, USA

Tolga Erim, DO Department of Gastroenterology, Cleveland Clinic Florida, Weston, FL, USA

David A. Etzioni, MD, MSHS Section of Colon and Rectal Surgery, Dignity Health Cancer Center/St. Joseph's Hospital and Medical Center, Phoenix, AZ, USA

Fergal J. Fleming, MD, FRCS Department of Surgery, University of Rochester Medical Center, Rochester, NY, USA

Carmen Fong, MD Department of Surgery, Mount Sinai Beth Israel, New York, NY, USA

Luanne Force, BA, MD University of Miami, Miami, FL, USA

Charles M. Friel, MD, FACS, FASCRS Department of Surgery, University of Virginia Medical Center, Charlottesville, VA, USA

Alodia Gabre-Kidan, MD, MPH Division of Colorectal Surgery, Johns Hopkins School of Medicine, Baltimore, MD, USA

Wolfgang B. Gaertner, MD, MSc, FACS, FASCRS Division of Colon and Rectal Surgery, University of Minnesota, Minneapolis, MN, USA

Richard Garfinkle, MD Division of Colon and Rectal Surgery, Jewish General Hospital, Montreal, QC, Canada

Fiona M. Gaunay, MD Colon and Rectal Surgery, Department of Surgery, Penn Medicine Lancaster General Health, Lancaster, PA, USA

Geoffrey S. Gaunay, MD Keystone Urology Specialists, Lancaster, PA, USA

Mahmoud Abu Gazala, MD Department of Surgery, Hadassah Hebrew University Medical Center, Jerusalem, Israel

Cristina B. Geltzeiler, MD Division of Colon and Rectal Surgery, University of Wisconsin, Madison, WI, USA

Jill C. Genua, MD Division of Colon and Rectal Surgery, Stony Brook School of Medicine, Stony Brook University Medical Center, Stony Brook, NY, USA

Sean C. Glasgow, MD, FACS, FASCRS Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

Emre Gorgun, MD, FACS, FASCRS Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

Michael J. Grieco, MD, FACS, FACRS Division of Colon and Rectal Surgery, New York University, New York, NY, USA

Alexis L. Grucela, MD, FACS, FASCRS Division of Colorectal Surgery, Department of Surgery, New York University Langone Medical Center, New York, NY, USA

Angelita Habr-Gama, MD, PhD Angelita and Joaquim Gama Institute, São Paulo, Brazil

Jason F. Hall, MD, MPH, FACS, FASCRS Department of Surgery, Boston Medical Center/Boston University School of Medicine, Boston, MA, USA

Boston University School of Medicine, Boston, MA, USA

Alexis R. Harvey, BS, MDPH School of Medicine, Case Western Reserve University, Cleveland, OH, USA

University Hospitals Cleveland Medical Center, Medical School, Cleveland, OH, USA

Taryn E. Hassinger, MD Department of Surgery, University of Virginia Medical Center, Charlottesville, VA, USA

Dana Hayden, MD, MPH Division of Colon and Rectal Surgery, Rush University Medical Center, Chicago, IL, USA

Ramzi M. Helewa, MD, MSc, FRCSC Department of Surgery, St. Boniface General Hospital, University of Manitoba, Winnipeg, MB, Canada

David J. Hiller, MD Novant Health, Winston-salem, North Carolina, USA

Richard S. Hoehn, MD Department of Surgery, University of Cincinnati, Cincinnati, OH, USA

Nir Horesh, MD Department of General Surgery, Mount Sinai Hospital, New York, NY, USA

Jennifer E. Hrabe, MD Division of Colon and Rectal Surgery, University of Iowa Hospitals and Clinics, Iowa City, IA, USA

Vanessa W. Hui, MD Department of Surgery, University of Miami, Miami, FL, USA

Tracy L. Hull, MD Department of Colorectal Surgery, Digestive Disease and Surgery Institute, Cleveland Clinic, Cleveland, OH, USA

Neil H. Hyman, MD, FACS Section of Colon and Rectal Surgery, Department of Surgery, Center for Digestive Disease, University of Chicago Medicine, Chicago, IL, USA

Eric K. Johnson, MD, FACS, FASCRS Department of Colon and Rectal Surgery, Cleveland Clinic Foundation, Cleveland, OH, USA

Matthew F. Kalady, MD Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

Gregory D. Kennedy, MD, PhD Division of Gastrointestinal Surgery, Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA

Cindy Kin, MD, MS Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA

Ravi P. Kiran, MBBS, MS, FRCS (Eng) Division of Colorectal Surgery, Columbia University Medical Center and Mailman School of Public Health, New York, NY, USA

Center for Innovation and Outcomes Research, New York Presbyterian Hospital-Columbia, New York, NY, USA

Crystal P. Koerner, MD Division of Colon and Rectal Surgery, Department of Surgery, Emory University School of Medicine, Atlanta, GA, USA

Monika A. Krezalek, MD Department of Surgery, University of Chicago Medicine, Chicago, IL, USA

Anjali S. Kumar, MD, FACS, FASCRS Department of Medical Education and Clinical Sciences, Washington State University, Spokane, WA, USA

Alex J. Ky, MD, FACS Department of Surgery, Mount Sinai School of Medicine, New York, NY, USA

Sebastien Lachance, MD, MsC(c) Division of Colorectal Surgery, Jewish General Hospital, Montreal, QC, Canada

Ron G. Landmann, MD Section of Colon and Rectal Surgery, Department of Surgical Oncology, Baptist-MD Anderson Cancer Center, Jacksonville, FL, USA

Russell C. Langan, MD Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY, USA

Erin O. Lange, MD, MSPH Colon and Rectal Surgery, SSM Health/St Mary's Hospital, Madison, WI, USA

Sean J. Langenfeld, MD, FACS, FASCRS Department of Surgery, University of Nebraska Medical Center, Omaha, NE, USA

Janet T. Lee, MD, MS Division of Colon and Rectal Surgery, Colon and Rectal Surgery Associates, Saint Paul, MN, USA

Steven A. Lee-Kong, MD Department of Surgery, Columbia University, New York, NY, USA

David Liska, MD Department of Colorectal Surgery, Digestive Disease and Surgery Institute, Cleveland Clinic, Cleveland, OH, USA

David M. Lisle, MD Medstar Franklin Square Medical Center for Digestive Disease, Baltimore, MD, USA

Najjia N. Mahmoud, MD, FACS, FASCRS Division of Colon and Rectal Surgery, Department of Surgery, University of Pennsylvania Health System, Philadelphia, PA, USA

Robert A. Malizia, MD Section of Colon and Rectal Surgery, Department of Surgery, Albany Medical College, Albany, NY, USA

David A. Margolin (Deceased), MD, FACS, FASCRS Ochsner Clinical School, New Orleans, LA, USA

David J. Maron, MD, MBA Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, FL, USA

Dipen C. Maun, MD Franciscan Alliance Hospitals, Indianapolis, IN, USA

John Migaly, MD, FACS, FASCRS Division of Advanced GI and Oncology Surgery, Duke University Medical Center, Durham, NC, USA

Jason S. Mizell, MD Colorectal Surgery Division, Department of Surgery, University of Arkansas for Medical Sciences, Little Rock, AR, USA

Melanie S. Morris, MD, FACS Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA

Birmingham VA Medical Center, Birmingham, AL, USA

Margaux N. Mustian, MD Department of Surgery, University of Alabama at Birmingham, Birmingham, AL, USA

Matthew G. Mutch, MD Section of Colon and Rectal Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

Rahul Narang, MD NYU Rangone Health, New York, NY, USA

Daniel W. Nelson, DO Department of Surgery, William Beaumont Army Medical Center, El Paso, TX, USA

Martin Newman, MD Department of Plastic and Reconstructive Surgery, Cleveland Clinic Florida, Weston, FL, USA

Vahagn C. Nikolian, MD Department of General Surgery, University of Michigan Health System, Ann Arbor, MI, USA

Pasha J. Nisar, MA, MBBChair, DM, FRCS Department of Colorectal Surgery, Ashford and St. Peter's Hospitals NHS Foundation Trust, Chertsey, UK

Juan J. Nogueras, MD, FACS, FASCRS Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, FL, USA

Joseph R. Notaro, MD, FACS, FASCRS Department of Surgery, RWJ Barnabas Health, Edison, NJ, USA

Mary T. M. O'Donnell, MD Walter Reed National Military Medical Center, Bethesda, MD, USA

Guy R. Orangio, MD, FACS, FASCRS LSU Health Science Center, University Medical Center, New Orleans, LA, USA

Ian M. Paquette, MD Division of Colon and Rectal Surgery, Department of Surgery, University of Cincinnati Medical Center, Cincinnati, OH, USA

Nilam D. Patel, BS Case Western Reserve University School of Medicine, Cleveland, OH, USA

Rodrigo Oliva Perez, MD, PhD Angelita and Joaquim Gama Institute, São Paulo, Brazil

Andrea M. Petrucci, MD, MEd, FRCSC Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, FL, USA

Alon J. Pikarsky, MD Department of Surgery, Hadassah Hebrew University Medical Center, Jerusalem, Israel

Jeffery L. Ponksy, MD, FACS Department of Surgery, Cleveland Clinic Lerner College of Medicine, Case Western Reserve University, Cleveland, OH, USA

Anathea C. Powell, MD Department of Surgery, Brigham and Women's Hospital, Boston, MA, USA

Scott E. Regenbogen, MD, MPH Division of Colorectal Surgery, Department of General Surgery, University of Michigan Health System, Ann Arbor, MI, USA

Petachia Reissman, MD, FACS Department of General Surgery, Shaare-Zedek Medical Center, Hebrew University School of Medicine, Jerusalem, Israel

Rebecca Rhee, MD Division of Colorectal Surgery, Maimonides Medical Center, Brooklyn, NY, USA

Aaron S. Rickles, MD, MPH Rochester Colon and Rectal Surgeons, P.C. Rochester, New York, NY, USA

David E. Rivadeneira, MD, MBA, FACS, FASCRS Surgical Strategic Initiatives for Northwell Health System, Woodbury, NY, USA

Surgical Services and Colorectal Surgery at Huntington Hospital, Woodbury, NY, USA

Hofstra University School of Medicine, Woodbury, NY, USA

Sandra Rodriguez, MD Department of Gastroenterology, Cleveland Clinic Florida, Weston, FL, USA

Howard M. Ross, MD, FACS, FASCRS Division of Colon and Rectal Surgery, Lewis Katz School of Medicine at Temple University, Temple University Health System, Philadelphia, PA, USA

Dana R. Sands, MD Department of Colorectal Surgery, Cleveland Clinic Florida, Weston, FL, USA

Laurence R. Sands, MD, MBA, FACS, FASCRS Division of Colon and Rectal Surgery, Department of Surgery, University of Miami Miller School of Medicine, Miami, FL, USA

Guilherme Pagin São Julião, MD Angelita and Joaquim Gama Institute, São Paulo, Brazil

Nicole M. Saur, MD Division of Colon and Rectal Surgery, Department of Surgery, University of Pennsylvania, Philadelphia, PA, USA

Andrew T. Schlussel, DO Department of General Surgery, Madigan Army Medical Center, Tacoma, WA, USA

David M. Schwartzberg, MD Donald and Barbara Zucker School of Medicine at Hofstra/Northwell; Harbor View Medical Services, Port Jefferson, NY, USA

Anna Serur, MD, FACS, FASCRS Department of Colorectal Surgery, Maimonides Medical Center, Brooklyn, NY, USA

Sherief Shawki, MD, MSc Department of Colorectal Surgery, Mayo Clinic, Rochester, MN, USA

Bo Shen, MD Center for Inflammatory Bowel Diseases, Columbia Medical Center, New York, NY, USA

Chaya Shwaartz, MD Department of Surgery, Sheba Medical Center, Tel Aviv, Israel

Shafik M. Sidani, MD Department of Colon and Rectal Surgery, Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

Michael Sigman, MD Department of General Surgery, Loyola University Medical Center, Maywood, IL, USA

Michael J. Snyder, MD, FACS, FASCRS Department of Surgery, McGovern Medical School, The University of Texas Health Science Center at Houston, Houston, TX, USA

Jenny R. Speranza, MD, FACS, FASCRS Division of Colorectal Surgery, Department of Surgery, University of Rochester Medical Center, Rochester, NY, USA

Scott R. Steele, MD, MBA, FACS, FASCRS Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

Emily Steinhagen, MD Department of Surgery, University Hospitals Cleveland Medical Center Department, Case Western Reserve University School of Medicine, Cleveland, OH, USA

David B. Stewart Sr, MD, FACS, FASCRS Section Chief of Colorectal Surgery, Department of Surgery, University of Arizona, Tucson, AZ, USA

Luca Stocchi, MD Department of Colorectal Surgery, Digestive Disease and Surgery Institute, Cleveland Clinic, Cleveland, OH, USA

Sarah B. Stringfield, MD Department of Surgery, University of California San Diego Health System, San Diego, CA, USA

Andrew T. Strong, MD Department of General Surgery, Cleveland Clinic Foundation, Cleveland, OH, USA

Department of General Surgery, Cleveland Clinic Lerner College of Medicine, Case Western Reserve University, Cleveland, OH, USA

Patrick S. Sullivan, MD, FACS, FASCRS Division of Colon and Rectal Surgery, Department of Surgery, Emory University School of Medicine, Atlanta, GA, USA

Patricia Sylla, MD, FACS, FASCRS Division of Colorectal Surgery, Department of Surgery, Icahn School of Medicine at Mount Sinai Hospital, New York, NY, USA

Lameese Tabaja, MD Department of Colon and Rectal Surgery, Digestive Disease Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

James Tankel, MBBS, MRCS Department of General Surgery, Shaare Zedek Medical Center, Jerusalem, Israel

James P. Taylor, MBBChir, MPH Department of Surgery, Johns Hopkins Hospital, Baltimore, MD, USA

Charles A. Ternent, MD, FACS, FASCRS Section of Colon and Rectal Surgery, CHI Bergan Mercy Medical Center, Creighton University School of Medicine, Omaha, NE, USA

Earl V. Thompson IV, MD Division of Colon and Rectal Surgery, University of Cincinnati College of Medicine, Cincinnati, OH, USA

Megan C. Turner, MD Department of Surgery, Duke University Medical Center, Durham, NC, USA

Konstantin Umanskiy, MD, FACS Department of Surgery, University of Chicago, Chicago, IL, USA

Bruna Borba Vailati, MD Angelita and Joaquim Gama Institute, São Paulo, Brazil

Brian T. Valerian, MD, FACS, FASCRS Section of Colon and Rectal Surgery, Department of Surgery, Albany Medical College, Albany, NY, USA

Julie Ann Van Koughnett, MD, MEd, FRCSC, FACS Department of Surgery, London Health Sciences Center University Hospital, London, ON, Canada

David A. Vivas, MD Colon and Rectal Surgeon, Stony Brook, NY, USA

Jon D. Vogel, MD University of Colorado, Aurora, CO, USA

Avery S. Walker, MD Department of Colon and Rectal Surgery, Ochsner Medical Center, New Orleans, LA, USA

Allison Weaver, BA Case Western Reserve School of Medicine, Cleveland, OH, USA

Martin R. Weiser, MD Department of Surgery, Memorial Sloan Kettering Cancer Center, New York, NY, USA

Eric G. Weiss, MD Cleveland Clinic Florida, Weston, FL, USA

Ian White, MBBS Meir Medical Center, Kfar Saba, Israel

Department of Surgery B, Meir Medical Center, Kfar Saba, Israel

Kirsten Bass Wilkins, MD, FACS, FASCRS Department of Surgery, RWJ Barnabas Health, Edison, NJ, USA

Estelle J. Williams, MD Department of Surgery, University of Washington, Seattle, WA, USA

Joshua H. Wolf, MD Department of Surgery, Sinai Hospital, LifeBridge Health, Baltimore, MD, USA

Zhaomin Xu, MD Department of Surgery, University of Rochester Medical Center, Rochester, NY, USA

Shlomo Yellinek, MD Department of General Surgery, Shaare-Zedek Medical Center, Hebrew University School of Medicine, Jerusalem, Israel

Fia Yi, MD San Antonio Military Medical Center, Houston, TX, USA

Jeanette Zhang, MD Department of Surgery, Temple University Hospital, Philadelphia, PA, USA

Oded Zmora, MD, FACS, FASCRS Department of Surgery, Shamir Medical Center (Assaf Harofe), Tel Aviv, Israel

Department of Surgery, Sackler School of Medicine, Tel-Aviv University, Tel Aviv, Israel

Terry Zwiep, MD, MSc, FRCSC Department of Surgery, London Health Sciences Center University Hospital, London, ON, Canada

Part I

Evaluation and Perioperative

Anorectal Examination

1

Nilam D. Patel, Scott R. Steele,
and Emily Steinhagen

Refer to Algorithm in Fig. 1.1

A. Chief Complaint

Eliciting a thorough history of the chief complaint is a critical first step in evaluating an anorectal complaint. Because of the sensitive nature of the complaint, patients may be reluctant or embarrassed to volunteer details, thus specific questions are helpful. Often, a careful history will enable the clinician to diagnose the patient and the physical exam is confirmatory. At a minimum, it will make it possible to generate a focused differential diagnosis. The quality, location, and duration of the chief complaint should be elicited. The patient should be asked about palliating and provoking factors such as eating and bowel movements. Common chief complaints include, but are not limited to: bleeding, anorectal pain, constipation, diarrhea, fecal incontinence, a palpable lesion, and itching. A list of common anorectal Complaints and pathologies is found in Table 1.1. It is important to note the quantity of bleeding, timing of blood loss, and characterization as melena or hematochezia as these details suggest different pathologies. Other general inquires that can be helpful are whether the patient feels pain or pressure with bowel movements, if there has been a change in the caliber, quality, or frequency of the stool, tenesmus, incomplete evacuation, urgency, and characterization of rectal discharge (bloody, mucoid, liquid, fecal) if present. It is worthwhile to ask what the patients have already done to try to treat the problem. Finally, it should be noted if the patient has experienced associated systemic changes such as weight loss, fatigue, nausea, or abdominal pain. Further targeted questioning will be dependent on the suspected pathology.

B. History

Understanding the patient's past medical history, family history, and various other details regarding their health and daily activities is the next step for proper evaluation of anorectal complaints. It is important to inquire whether there is a personal or family history of inflammatory bowel disease or colorectal malignancy. Medications should be reviewed as some may cause or exacerbate anorectal symptoms. Specific classes of medications to

N. D. Patel
Case Western Reserve University School of Medicine, Cleveland, OH, USA

S. R. Steele
Department of Colorectal Surgery, Cleveland Clinic, Cleveland, OH, USA

E. Steinhagen (✉)
Department of Surgery, University Hospitals Cleveland Medical Center Department, Case Western Reserve University School of Medicine, Cleveland, OH, USA
e-mail: Emily.Steinhagen@UHhospitals.org

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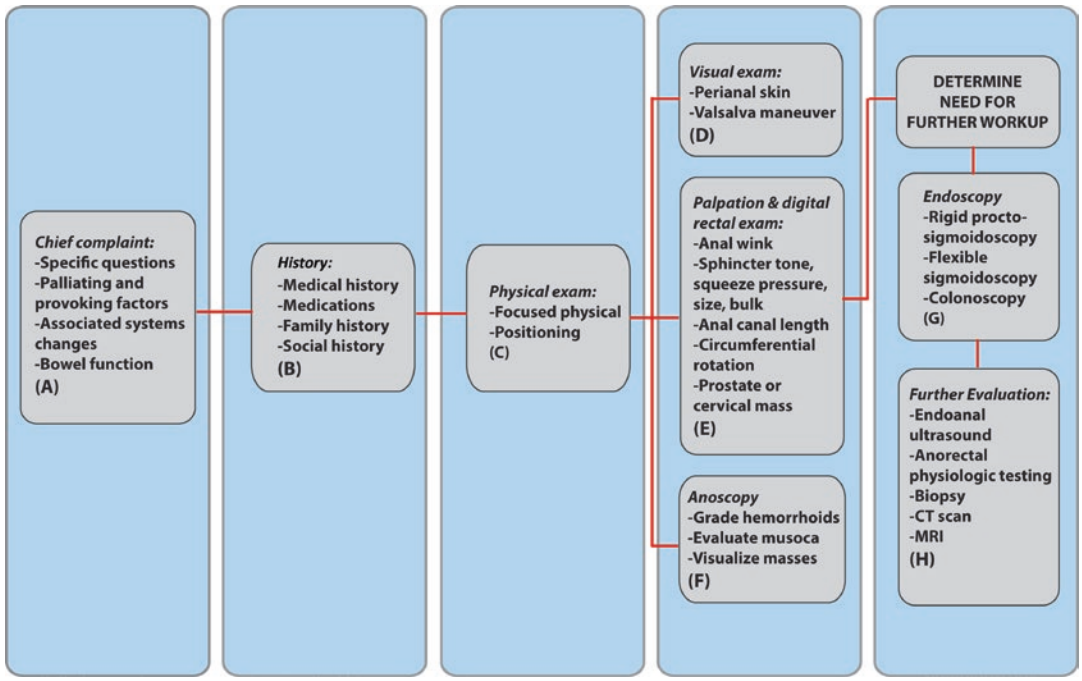

Fig. 1.1 Algorithm for anorectal examination

Table 1.1 Common anorectal compliant and pathologies

Complaints	Pathologies
Bleeding	Hemorrhoids
Rectal discharge	Anal fissures
Itching	Anal fistula
Anorectal pain	Stricture
Constipation	Abscess
Diarrhea	Rectal prolapse
Fecal incontinence	Pelvic floor dysfunction
Palpable lesions	Skin tags
Prolapse	Pilonidal disease
Pain or pressure with bowel movements	Infection
Incomplete evacuation of stool	Condyloma
Tenesmus	Pruritus ani
	Inflammatory bowel disease
	Hypertrophied anal papillae
	Malignancy

note include antiplatelet agents, anticoagulants, and anticholinergics. Previous colorectal surgeries, anorectal procedures, and endoscopes should be discussed. Some gastrointestinal procedures including cholecystectomy and gastric bypass are relevant because these can be involved in common gastrointestinal and anorectal symptoms. Social, sexual, and dietary histories need to be elicited including smoking history, fiber and fluid intake, and sexual history of anal-receptive intercourse. A history of urinary issues may also be potentially relevant. Finally, a comprehensive family history should be taken including history of hemorrhoids, polyps, colorectal cancers, other cancers, and inflammatory bowel disease. A positive family history of certain malignancies may put the patient at a higher risk of developing cancer and changes the screening guidelines for colonoscopy.

C. Physical Exam

The physical exam may make the patient feel vulnerable and embarrassed, so it is important to establish a relaxed and professional environment for the exam. An assistant should be present during the exam, the patient should be draped properly, and efforts should be made to communicate with

the patient throughout the exam. An overly apprehensive or anxious patient may have an anal or gluteal spasm that can hinder a proper exam. A focused physical exam with attention to the abdomen and inguinal regions is recommended prior to the anorectal exam. There are three positions that allow for adequate exposure for anorectal exam. The first and most optimal is the prone jackknife position. This position allows for full visualization of the entire anus and the perianal, perineal, and sacral regions. The Sims' position, also referred to as the left lateral decubitus position, places the patient on the left side with the buttocks slightly off the edge of the table with the right knee and hip in flexion to form a 90° angle with the trunk. This position is useful when a proctoscopic table is not available or the patient is elderly or debilitated. However, it does not allow for optimal visualization of the perineal region. Lastly, lithotomy is not ideal for most examinations, but may be used if necessary, or if indicated by complaints such as rectovaginal fistula.

D. Visual Inspection

The anorectal exam should begin with visualization of the external aspects of the perianal region by gentle spreading of the buttocks. Careful examination of the skin evaluates for scars, skin tags, inflammation, pruritus, excoriations, condyloma, fecal soiling, blood or mucous discharge, hemorrhoids, rectal prolapse, fissures, external fistula openings, perineal body bulk, sphincter shape, and mass. If rectal, uterine, vaginal, or bladder prolapse are suspected, the Valsalva maneuver should be performed in which the patient is asked to bear down. If rectal prolapse is suspected but cannot be elicited on the exam table, the Valsalva maneuver may be performed in a squatting or sitting position over a toilet with utilization of handheld mirror for examination. Findings from visual exam should be documented avoiding clock-face descriptions as they differ based on patient position; instead, directional terms such as anterior/posterior or left/right should be utilized.

E. Palpation and Digital Rectal Exam

The next step of the anorectal evaluation is palpation of the perianal skin and a digital rectal exam using a gloved and well-lubricated index finger. To evaluate the function of the pudendal nerve, the anocutaneous reflex, "anal wink", can be elicited by gentle scratching of the perianal skin around the anal verge. Next, the lubricated index finger should be gently inserted into the rectum and the following should be assessed: resting sphincter tone and squeeze pressure, sphincter size and bulk, and anal canal length. A circumferential rotation of the finger is required to appreciate a global assessment for masses or sensitivity. To fully evaluate for abnormalities and masses, the prostate should be palpated in males and the cervix in females. If a mass is identified, the extent and location needs to be noted and it should be characterized as firm or soft, fixed or mobile, and rough, smooth, or ulcerated. If the patient cannot tolerate the exam due to pain or sensitivity, the exam may require the use of a topical anesthetic, be deferred, or potentially be performed under anesthesia.

F. Anoscopy

After the completion of the digital rectal exam, anoscopy should be completed to visually inspect the interior of the anal canal and rectum. A lubricated, lighted anoscope should be slowly advanced into the anus until it is fully inserted. Anoscopy can be used to grade hemorrhoids and determine whether they prolapse outside of the anal canal. Other conditions that can be evaluated via anoscopy are the presence of inflammation on the mucosa, fissures, hypertrophied anal papillae, mass, or internal fistula opening.

G. Endoscopy

Endoscopy is undertaken to obtain visualization of the rectum and distal sigmoid colon. This is typically done when there is no clear evidence from prior exams that point to an etiology of the anorectal complaint or to ensure that the complaint is related to an anorectal finding and not a more proximal lesion. Rigid proctosigmoidoscopy and flexible sig-

moidoscopy are the most common endoscopic procedures. With proper technique, patients should feel minimal discomfort with these procedures. Formal bowel prep is not required; the rectum and distal sigmoid can be cleaned with a single phosphate based enema prior to the procedure. Rigid proctosigmoidoscopy is useful for examining and obtaining a biopsy from the entire rectum and the distal sigmoid colon. The full length of the proctoscope is 25 cm and circumferential exam is undertaken upon slow withdrawal of the scope. It is the standard tool for measuring the distance of a rectal tumor from the dentate line or anal verge because of its increased accuracy over the flexible scope. Flexible sigmoidoscopy is used more often because of increased patient comfort, ease of the exam, and a three- to sixfold increase in yield of findings in the rectum and sigmoid colon compared to rigid proctoscopy. The average length of the flexible scope is 60 cm and indications for this procedure include bright red rectal bleeding, radiation and other types of proctitis, Crohn's colitis, neoplasia, post-operative evaluation of anastomoses, and suspected strictures. Despite the advantages of flexible sigmoidoscopy, this procedure does not substitute for colonoscopy. Colonoscopy is indicated as the endoscopic procedure of choice when the workup does not clearly identify the causative issue or when otherwise indicated based on age and family history.

H. Further Evaluation

Further diagnostic evaluation may be necessary depending on the nature of the complaint and the findings gathered from the preceding exams in this algorithm. Endoanal ultrasound (EUS) can be useful for gathering more details involving pathologies such as an abscess, fistula, or tumor as well as evaluating the pelvic floor structures and anal sphincter. For determining the pathology of ulcerations or masses observed throughout the exam, biopsy can be obtained via anoscopy or endoscopy. Anorectal physiologic testing including manometry, measurement of rectal volume sensation, rectoanal inhibitory reflex, and balloon expulsion can be used to investigate underlying etiology of pelvic floor dysfunction. MRI is recommended for the staging of rectal tumors and a CT scan is recommended assessment of metastatic disease.

Conclusion

A comprehensive anorectal evaluation is an important process in the care of a patient with an anorectal complaint. This algorithm guides clinicians in a stepwise process through the history and physical examination. Equipped with the information elicited through this evaluation, the clinician can move forward to develop an assessment and treatment plan for the patient's anorectal complaint.

Suggested Reading

Billingham RP, Isler JT, Kimmins MH, Nelson JM, Schweitzer J, Murphy MM. The diagnosis and management of common anorectal disorders. Curr Probl Surg. 2004;41(7):586–645.

Davis K, Valente MA. Endoscopy. In: Steele SR, Hull TL, Read TE, Saclarides TJ, Senagore AJ, Whitlow CB, editors. The ASCRS textbook of colon and rectal surgery. 3rd ed. Cham: Springer International Publishing; 2016. p. 45–77.

Ferguson MA. Office evaluation of rectal bleeding. Clin Colon Rectal Surg. 2005;18(4):249–54.

Henderson PK, Cash BD. Common anorectal conditions: evaluation and treatment. Curr Gastroenterol Rep. 2014;16(10):1–5.

Monson JRT, Weiser MR, Buie WD, Chang GJ, Rafferty JF, Buie WD, et al. Practice parameters for the management of rectal cancer (Revised). Dis Colon Rectum. 2013;56(5):535–50. Available from: http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00003453-201305000-00002.

Paquette IM, Varma MG, Kaiser AM, Steele SR, Rafferty JF. The American Society of Colon and Rectal Surgeons' clinical practice guideline for the treatment of fecal incontinence. Dis Colon Rectum. 2015;58(7):623–36. Available from: http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00003453-201507000-00002.

Valente MA. Investigations for anorectal disease. In: Zutshi M, editor. Anorectal disease: contemporary management. 1st ed. Cham: Springer International Publishing; 2016. p. 33–50.