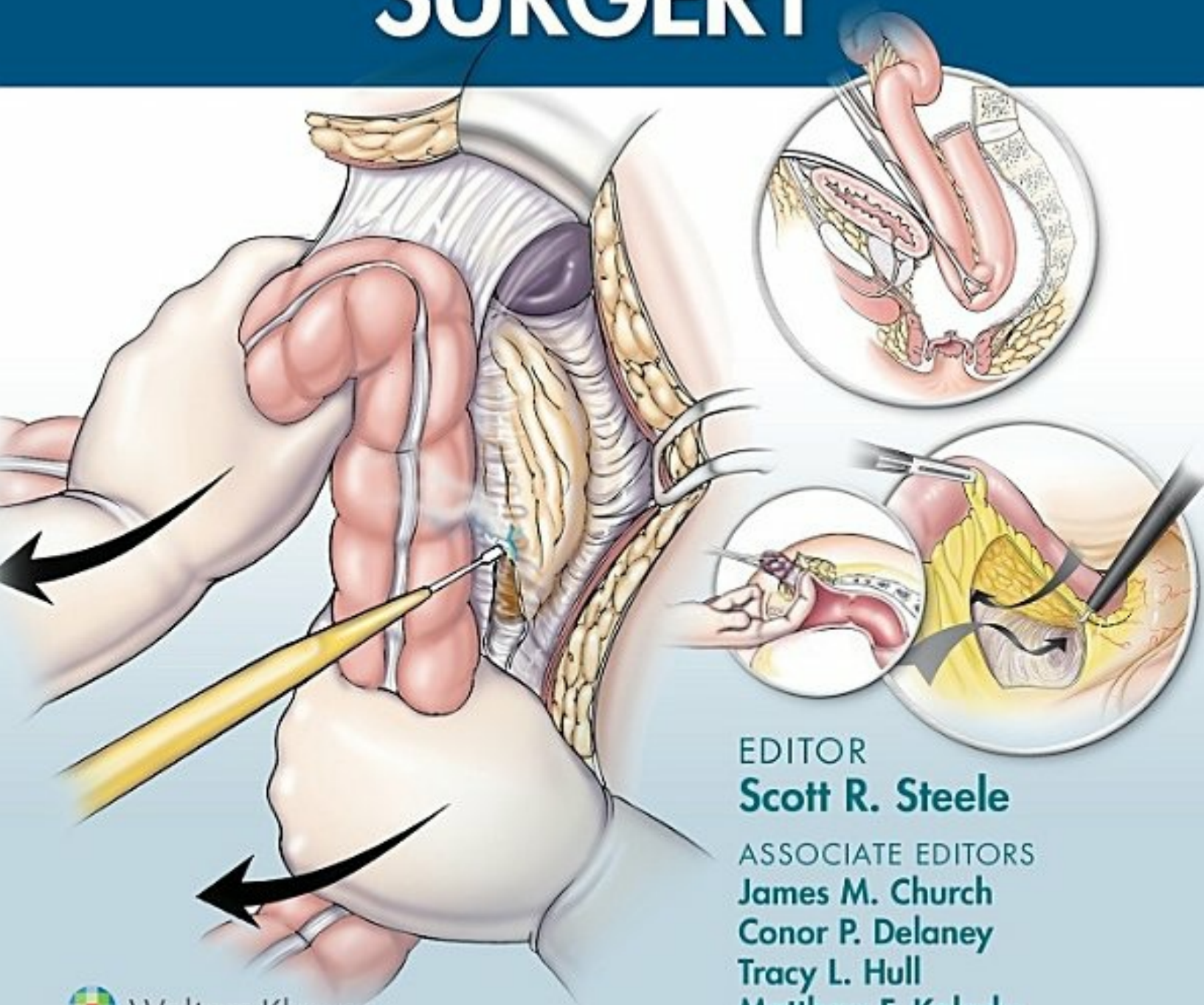


 **Cleveland Clinic**

Illustrated Tips and Tricks in

COLON AND RECTAL SURGERY



EDITOR
Scott R. Steele

ASSOCIATE EDITORS
James M. Church
Conor P. Delaney
Tracy L. Hull
Matthew F. Kalady

 Wolters Kluwer

**Cleveland Clinic
Illustrated Tips
and Tricks
in Colon and
Rectal Surgery**

Cleveland Clinic Illustrated Tips and Tricks in Colon and Rectal Surgery

Editor

Scott R. Steele, MD, MBA

Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case
Western Reserve University
Rupert B. Turnbull MD Endowed Chair in
Colorectal Surgery
Chairman, Department of Colorectal
Surgery
Cleveland Clinic Foundation
Cleveland, Ohio

Associate Editors

James Church, MBChB, FRACS

Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case
Western Reserve University
Staff Surgeon
Department of Colorectal Surgery
Cleveland Clinic Foundation
Cleveland, Ohio

Conor P. Delaney, MD, MCh, PhD, FACS, FRCSI, FASCRS, FRCSI (Hon)

Chairman, Digestive Disease and Surgery
Institute
Victor W. Fazio MD Endowed Chair in
Colorectal Surgery
Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case
Western Reserve University
Cleveland Clinic Foundation
Cleveland, Ohio

Tracy Hull, MD

Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case
Western Reserve University
Section Head of IBD
Department of Colorectal Surgery
Cleveland Clinic Foundation
Cleveland, Ohio

Matthew F. Kalady, MD

Professor and Vice-Chairman
Department of Colorectal Surgery
James Church, MD, and Edward
DeBartolo Jr. Family Chair in Colorectal
Surgery
Co-Director, Comprehensive Colorectal
Cancer Program
Digestive Disease Institute
Cleveland Clinic Foundation
Cleveland, Ohio



Philadelphia • Baltimore • New York • London
Buenos Aires • Hong Kong • Sydney • Tokyo

Acquisitions Editor: Keith Donnellan
Development Editor: Sean McGuire
Editorial Coordinator: Lindsay Ries
Marketing Manager: Julie Sikora
Senior Production Project Manager: Alicia Jackson
Team Lead, Design: Steve Druding
Senior Manufacturing Coordinator: Beth Welsh
Prepress Vendor: S4Carlisle Publishing Services

Copyright © 2021 Wolters Kluwer.

All rights reserved. This book is protected by copyright. No part of this book may be reproduced or transmitted in any form or by any means, including as photocopies or scanned-in or other electronic copies, or utilized by any information storage and retrieval system without written permission from the copyright owner, except for brief quotations embodied in critical articles and reviews. Materials appearing in this book prepared by individuals as part of their official duties as U.S. government employees are not covered by the above-mentioned copyright. To request permission, please contact Wolters Kluwer at Two Commerce Square, 2001 Market Street, Philadelphia, PA 19103, via email at permissions@lww.com, or via our website at shop.lww.com (products and services).

9 8 7 6 5 4 3 2 1

Printed in China

Library of Congress Cataloging-in-Publication Data

Names: Steele, Scott R. (Surgeon), editor. | Cleveland Clinic Foundation.

Title: Cleveland Clinic illustrated tips and tricks in colon and rectal surgery / [edited by] Scott R. Steele.

Other titles: Illustrated tips and tricks in colon and rectal surgery

Description: Philadelphia : Lippincott Williams & Wilkins, [2021] |

Includes bibliographical references and index. | Summary: "Tips and

Tricks in Surgery will be a series of books that offer the sort of wisdom attending surgeons pass on to residents or fellows about how to perform surgery (it is patterned after the series being developed in the orthopaedic surgery program). Keith Lillemoe, chair of surgery at MGH, is the series editor. Each volume will cover one area of surgery and will be written by faculty and residents of a single institution renowned for its work in that area"—Provided by publisher.

Identifiers: LCCN 2019033892 | ISBN 9781975108250 (paperback) | eISBN: 9781975108816

Subjects: MESH: Colon—surgery | Rectum—surgery | Colorectal Surgery—methods

Classification: LCC RD543.C57 | NLM WI 650 | DDC 617.5/547—dc23

LC record available at <https://lccn.loc.gov/2019033892>

This work is provided "as is," and the publisher disclaims any and all warranties, express or implied, including any warranties as to accuracy, comprehensiveness, or currency of the content of this work.

This work is no substitute for individual patient assessment based upon healthcare professionals' examination of each patient and consideration of, among other things, age, weight, gender, current or prior medical conditions, medication history, laboratory data and other factors unique to the patient. The publisher does not provide medical advice or guidance and this work is merely a reference tool. Healthcare professionals, and not the publisher, are solely responsible for the use of this work including all medical judgments and for any resulting diagnosis and treatments.

Given continuous, rapid advances in medical science and health information, independent professional verification of medical diagnoses, indications, appropriate pharmaceutical selections and dosages, and treatment options should be made and healthcare professionals should consult a variety of sources. When prescribing medication, healthcare professionals are advised to consult the product information sheet (the manufacturer's package insert) accompanying each drug to verify, among other things, conditions of use, warnings and side effects and identify any changes in dosage schedule or contraindications, particularly if the medication to be administered is new, infrequently used or has a narrow therapeutic range. To the maximum extent permitted under applicable law, no responsibility is assumed by the publisher for any injury and/or damage to persons or property, as a matter of products liability, negligence law or otherwise, or from any reference to or use by any person of this work.

shop.lww.com

“The opportunity to work with excellent people ... the ability to work in a collegial fashion . . . and to witness the gradual growth of the specialty.”

—Victor W. Fazio, MB, BS, FRACS, FACS (2012)

Contents

Contributors

Foreword

Preface

IN THE OPERATING ROOM AND ANATOMY

- 1 • **Anatomy of the Colon, Rectum, and Anus**
Richard L. Drake, Jennifer M. McBride, Michelle D. Inkster,
and James S. Wu
- 2 • **Tools of the Trade: Retractors, Scopes, Probes, and More**
David Liska
- 3 • **Principles of Operative Positioning**
Daniel R. Fish
- 4 • **Advanced Endoluminal Surgery: Endoscopic Mucosal
Resection and Endoscopic Submucosal Dissection**
Emre Gorgun
- 5 • **Combined Endoscopic and Laparoscopic Surgery**
Emre Gorgun
- 6 • **Interventional Inflammatory Bowel Disease: Endoscopic
Management of Complex Inflammatory Bowel Disease**
Bo Shen
- 7 • **Office Endoscopy**
James Church

ANORECTAL DISEASE

- 8 • **Hemorrhoidectomy**
Massarat Zutshi
- 9 • **Anal Fissures: Lateral Internal Sphincterotomy**
James S. Wu
- 10 • **Anoplasty for Anal Stenosis**
Michael A. Valente
- 11 • **Anorectal Abscess**
Vladimir Bolshinsky and Joseph Trunzo
- 12 • **Complex Anorectal Fistulas**
Vladimir Bolshinsky and Stefan D. Holubar
- 13 • **Hidradenitis Suppurativa**
Anuradha R. Bhama and Scott R. Steele
- 14 • **Rectovaginal Fistula**
Tracy Hull
- 15 • **Rectourethral Fistulas**
Nicholas Hauser, Hadley Wood, and Kenneth Angermeier
- 16 • **Crohn Anorectal Disease**
James Church
- 17 • **Pilonidal Disease Excise versus Flap: Technical Tips**
Anuradha R. Bhama and Scott R. Steele
- 18 • **Anal Intraepithelial Neoplasia: Performing High-Resolution Anoscopy**
Michelle D. Inkster, Eric D. Willis, and James S. Wu

THE ABDOMEN

- 19 • **Anastomotic Construction Techniques**

Matthew F. Kalady

- 20 • **Complicated Anastomoses: Turnbull-Cutait**
Sherief Shawki
- 21 • **Left Colectomy**
Michael A. Valente
- 22 • **Right Colectomy**
Peter Mark Neary, Sherief Shawki, and Conor P. Delaney
- 23 • **Approaching the Transverse Colon**
N. Arjun Jeganathan and Jeremy M. Lipman
- 24 • **The Difficult Splenic Flexure**
Sherief Shawki
- 25 • **Cytoreductive Surgery and Hyperthermic Intraperitoneal
Chemotherapy**
Anthony Costales and Robert DeBernardo
- 26 • **Desmoids**
James Church
- 27 • **Enterocutaneous Fistula**
Michael A. Valente

THE PELVIS

- 28 • **Intraoperative Radiation Therapy for Colorectal Cancer**
Sudha R. Amarnath
- 29 • **Local Excision of Rectal Neoplasia**
Anuradha R. Bhama, David Maron, and Scott R. Steele
- 30 • **Approaching Presacral Tumors**
Christy Cauley and Michael A. Valente
- 31 • **Proctectomy from Above**
James P. Tiernan and Conor P. Delaney

- 32 • Transanal Total Mesorectal Excision**
Sherief Shawki, Dana Sands, and Matthew F. Kalady
- 33 • GYN-Onc Considerations for Complex and Multivisceral Colorectal Disease**
Mariam AlHilli and Robert DeBernardo
- 34 • Spinal and Orthopedic Considerations for Advanced Multivisceral Colorectal Cancer**
Lukas M. Nystrom and Nathan W. Mesko
- 35 • Intraoperative Urology Consultation**
Hadley Wood and Kenneth Angermeier

TECHNICAL TIPS FOR SPECIFIC SITUATIONS

- 36 • Complex Diverticular Disease: Colovaginal and Colovesicle Fistula Repair**
Michelle F. DeLeon, Steven D. Wexner, and Bradley J. Champagne
- 37 • Large Bowel Obstruction**
David M. Schwartzberg and David Liska
- 38 • Endometriosis**
Mariam AlHilli and Hermann Kessler
- 39 • Trauma of the Colon, Rectum, and Anus**
Eric K. Johnson and Scott R. Steele
- 40 • Ileal Pouch-Anal Anastomosis**
Tracy Hull
- 41 • Crohn Disease: Surgical Management**
David M. Schwartzberg and Stefan D. Holubar
- 42 • Colorectal Cancer: Management of Stage IV Disease**
Mohammad Ali Abbass and Bradley J. Champagne
- 43 • Construction of Intestinal Stomas**

Hermann Kessler, Mariane G. M. Camargo, and Eric G. Weiss

- 44 • **The Difficult Stoma**
Hermann Kessler and Mariane G. M. Camargo
- 45 • **Complex Abdominal Wall Reconstruction and Parastomal Hernia Repair after Colorectal Surgery**
Charlotte Horne and Ajita Prabhu
- 46 • **Kock Pouch (K-pouch)**
Sherief Shawki

PELVIC FLOOR DISORDERS

- 47 • **Rectal Prolapse**
Tracy Hull and Giovanna da Silva Southwick
- 48 • **Ventral Rectopexy**
Sherief Shawki
- 49 • **Sacral Neuromodulation and Sphincteroplasty for Fecal Incontinence**
Lisa C. Hickman and Cecile A. Ferrando
- 50 • **Vertical Rectus Abdominis Myocutaneous Flaps, Gluteal Flaps, and Plastic Surgery Reconstruction in Colorectal Surgery**
Emre Gorgun and Raymond Isakov
- 51 • **Complex Abdominal Wall Reconstruction Following Colorectal Surgery**
Clayton C. Petro and Michael J. Rosen
- 52 • **Constipation**
Tracy Hull
- 53 • **Botox of the Pelvic Floor and Acupuncture**
Massarat Zutshi

54 • Perineal Proctectomy
Amy Lightner

Index

Contributors

Mohammad Ali Abbass, MD

Colorectal Surgery Fellow
Cleveland Clinic Foundation
Cleveland, Ohio

Mariam AlHilli, MD

Assistant Professor of Surgery, Cleveland Clinic Lerner College of Medicine
Division of Gynecologic Oncology, Department of Obstetrics and
Gynecology
Cleveland Clinic
Cleveland, Ohio

Sudha R. Amarnath, MD

Assistant Professor
Department of Radiation Oncology
Cleveland Clinic Foundation
Cleveland, Ohio

Kenneth Angermeier, MD, FACS

Professor of Surgery (Urology)
Cleveland Clinic Lerner College of Medicine of Case Western Reserve
University
Director, Center for Genitourinary
Reconstruction
Glickman Urological and Kidney Institute
Cleveland Clinic
Cleveland, Ohio

Anuradha R. Bhama, MD, FACS, FASCRS

Department of Colorectal Surgery

Cleveland Clinic Foundation
Cleveland, Ohio

Vladimir Bolshinsky, MBBS, FRACS

Clinical Associate
Department of Colorectal Surgery
Digestive Disease & Surgery Institute
Cleveland Clinic
Cleveland, Ohio

Mariane G. M. Camargo, MD

Research Fellow
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Christy Cauley, MD

Fellow, Colorectal Surgery
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Bradley J. Champagne, FACS, FASCRS

Chairman of Surgery, Fairview Hospital
Director of Services, DDSI West Region
Professor of Surgery, Cleveland Clinic Lerner
School of Medicine
Medical Director of Fairview Ambulatory
Surgery Center
Fairview Hospital
Cleveland, Ohio

James Church, MBChB, FRACS

Staff Surgeon
Department of Colon and Rectal Surgery
Cleveland Clinic Foundation
Cleveland, Ohio

Anthony Costales, MD

Department of Obstetrics and Gynecology
OB/GYN and Women's Health Institute
Cleveland Clinic
Cleveland, Ohio

Robert DeBernardo, MD

Associate Professor of Surgery Lerner College of Medicine
Director of Peritoneal Malignancy Program
Division of Gynecologic Oncology
Cleveland Clinic
Cleveland, Ohio

**Conor P. Delaney, MD, MCh, PhD, FACS, FRCSI, FASCRS (Hon),
FRCSI (Hon)**

Chairman, Digestive Disease and Surgery
Institute
Victor W. Fazio MD Endowed Chair in Colorectal Surgery
Professor of Surgery, Cleveland Clinic Lerner
College of Medicine
Cleveland Clinic
Cleveland, Ohio

Michelle F. DeLeon, MD

Department of Colorectal Surgery
Digestive Disease and Surgery Institute
Cleveland Clinic Foundation
Cleveland, Ohio

Richard L. Drake, PhD

Director of Anatomy and Professor of Surgery
Cleveland Clinic Lerner College of Medicine of Case Western Reserve
University
Cleveland, Ohio

Cecile A. Ferrando, MD

Assistant Professor of Surgery
Women's Health Institute

Cleveland Clinic
Cleveland, Ohio

Daniel R. Fish, MD, MS

Clinical Associate Staff
Department of Colon and Rectal Surgery
Cleveland Clinic
Cleveland, Ohio

Emre Gorgun, MD, FACS, FASCRS

Staff Surgeon
Colorectal Surgery
Krause-Lieberman Chair in Laparoscopic Colorectal Surgery
Cleveland Clinic, Digestive Disease Institute
Cleveland, Ohio

Nicholas Hauser, MD

Assistant Professor
Department of Urology
University of Miami Miller School of Medicine
Miami, Florida

Lisa C. Hickman, MD

Section of Urogynecology and Reconstructive Pelvic Surgery
Obstetrics, Gynecology & Women's Health Institute
Cleveland Clinic Foundation
Cleveland, Ohio

Stefan D. Holubar, MD, MS

Director of Research
Department of Colon and Rectal Surgery
Cleveland Clinic
Cleveland Ohio

Charlotte Horne, MD

Fellow, Abdominal Wall Reconstruction
Department of Surgery
Cleveland Clinic

Cleveland, Ohio

Tracy Hull, MD

Professor of Surgery
Department of Colon and Rectal Surgery
The Cleveland Clinic Foundation
Cleveland, Ohio

Michelle D. Inkster, PhD, MD

Staff Gastroenterologist
DDSI Institute
Cleveland Clinic
Cleveland, Ohio

Raymond Isakov, MD

Assistant Professor of Surgery
Cleveland Clinic Lerner College of Medicine
Associate Program Director, Plastic Surgery Residency
Cleveland Clinic
Cleveland, Ohio

N. Arjun Jeganathan, MD

Fellow, Colorectal Surgery
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Eric K. Johnson, MD, FACS, FASCRS

Professor of Surgery
Cleveland Clinic Lerner College of Medicine
of Case Western Reserve University
Cleveland, Ohio

Matthew F. Kalady, MD

Professor and Vice-Chairman
Department of Colorectal Surgery
James Church, MD, and Edward DeBartolo Jr.
Family Chair in Colorectal Surgery

Co-Director, Comprehensive Colorectal
Cancer Program
Digestive Disease Institute
Cleveland Clinic
Cleveland, Ohio

Hermann Kessler, MD, PhD

Professor of Surgery
Department of Colorectal Surgery
Digestive Disease and Surgery Institute
Cleveland Clinic
Cleveland, Ohio

Ian Lavery, MD

Staff Colorectal Surgeon
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Amy Lightner, MD, FACS, FASCRS

Associate Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case Western
Reserve University
Staff Surgeon
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Jeremy M. Lipman, FACS, FASCRS

Associate Professor of Surgery
Cleveland Clinic Lerner College of Medicine of Case Western Reserve
University
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

David Liska, MD, FACS, FASCRS

Assistant Professor of Surgery

Department of Colorectal Surgery, Digestive
Disease & Surgery Institute
Department of Cancer Biology, Lerner Research
Institute
Cleveland Clinic
Cleveland, Ohio

David Maron, MD, MBA

Vice Chairman
Department of Colorectal Surgery
Cleveland Clinic Florida
Weston, Florida

Jennifer M. McBride, PhD

Director of Virtual Anatomy Education
Associate Professor of Surgery
Cleveland Clinic Lerner College of Medicine
Cleveland, Ohio

Nathan W. Mesko, MD

Assistant Professor, Center Director
Musculoskeletal Oncology
Department of Orthopaedic Surgery
Cleveland Clinic
Cleveland, Ohio

Peter Mark Neary, MD

Professor of Surgical Oncology
University Hospital Waterford/University
College Cork
Waterford, Ireland

Lukas M. Nystrom, MD

Staff Surgeon
Orthopaedic and Rheumatologic Institute
Cleveland Clinic
Cleveland, Ohio

Clayton C. Petro, MD

Staff Surgeon, Hernia Surgery Section
Department of Surgery
Cleveland Clinic
Cleveland, Ohio

Ajita Prabhu, MD, FACS

Associate Professor of Surgery
Assistant Program Director, General Surgery
Residency, Cleveland Clinic
Quality Institute Officer, Digestive Diseases and Surgery Institute
Cleveland Clinic Center for Abdominal Core Health
Department of Surgery
Cleveland Clinic
Cleveland, Ohio

Michael J. Rosen, MD

Professor of Surgery
Cleveland Clinic
Cleveland, Ohio

Dana Sands, MD

Staff Surgeon
Director of the Colorectal Physiology Center
at Cleveland Clinic Florida
Department of Colorectal Surgery
Cleveland Clinic Florida
Weston, Florida

David M. Schwartzberg, MD

Fellow, Colorectal Surgery
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Sherief Shawki, MD

Staff Colon and Rectal Surgery
Cleveland Clinic Foundation

Assistant Professor of Surgery
Cleveland Clinic Lerner Medical School of Medicine
Cleveland, Ohio

Bo Shen, MD

Professor of Medicine and The Ed and Joey Story Endowed Chair
Department of Gastroenterology/Hepatology/Nutrition
Cleveland Clinic
Cleveland, Ohio

Giovanna da Silva Southwick, MD

Staff Surgeon
Department of Colorectal Surgery
Cleveland Clinic Florida
Weston, Florida

Scott R. Steele, MD, MBA

Professor of Surgery
Cleveland Clinic Lerner College of Medicine of Case Western Reserve
University
Rupert B. Turnbull MD Endowed Chair in Colorectal Surgery
Chairman, Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

James P. Tiernan, PhD, MD

Consultant in Colorectal Surgery
John Goligher Colorectal Unit
Leeds, England

Joseph Trunzo, MD, FACS, FASCRS

Assistant Professor of Surgery
Department of Colorectal Surgery
Fairview Hospital
Cleveland Clinic
Cleveland, Ohio

Michael A. Valente, DO, FACS, FASCRS

Associate Professor of Surgery
Program Director, Colorectal Surgery Residency
Department of Colorectal Surgery
Digestive Disease and Surgery Institute
Cleveland Clinic
Cleveland, Ohio

Eric G. Weiss, MD, DIO

Chairman of Graduate
Medical Education
Residency Program Director
Colorectal Surgery Fellowship
Director of Surgical Endoscopy
Cleveland Clinic Florida
Weston, Florida

**Steven D. Wexner, MD, PhD (Hon), FACS, FRCS (Eng), FRCS (ED),
FRCSI (Hon), Hon FRCS (Glasg)**

Director, Digestive Disease Center
Chair, Department of Colorectal Surgery
Cleveland Clinic Florida
Weston, Florida
Clinical Professor of Surgery, Cleveland Clinic
Lerner College of Medicine of Case Western
Reserve University
Cleveland, Ohio
Clinical Affiliate Professor of Surgery, Charles E.
Schmidt College of Medicine, Florida Atlantic University
Boca Raton, Florida
Clinical Professor, Herbert Wertheim
College of Medicine, Florida International University
Miami, Florida
Professor of Surgery, The Ohio State University
Wexner College of Medicine
Columbus, Ohio
Affiliate Professor, Department of Surgery,
University of South Florida Morsani College of Medicine

Tampa, Florida
Honorary Professor, Division of Surgery
and Interventional Science, Department
of Targeted Intervention, University College London
London, England

Eric D. Willis, MD
Staff Pathologist
RMH Pathology Associates
OhioHealth
Columbus, Ohio

Hadley Wood, MD
Associate Professor
Glickman Urological and Kidney Institute
Cleveland Clinic
Cleveland, Ohio

James S. Wu, PhD, MD
Staff Surgeon
Digestive Diseases and Surgery Institute
Cleveland Clinic
Cleveland, Ohio

Massarat Zutshi, MD
Staff Colorectal Surgeon
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Foreword

It's an honor to be a part of the storied tradition of surgical giants who have mentored us previously, incredible colleagues here today, and the leaders that will follow for generations. May this volume portray some of the tips and tricks of the "Cleveland Clinic Way" for caring for patients with colorectal disease.

Scott R. Steele, MD, MBA
Chairman
Department of Colorectal Surgery
Cleveland Clinic
Cleveland, Ohio

Editor: Scott R. Steele, MD, MBA

Associate Editors: James Church, MBChB, FRACS,
Conor P. Delaney, MD,
Tracy Hull, MD,
Matthew F. Kalady, MD

Preface

In this era of evidence-based medicine, most of our clinical decisions are data driven ... and that is as it should be. However, patients constantly remind us of the infinite variations in human biology, and these reminders influence our care in ways that often cannot be measured. Data can only take us so far in the practice of colorectal surgery, and there is ample room for augmenting our practice with clinical acumen. Many of the diseases we treat present and evolve in ways that are not covered by the usual textbook or by the latest review article. We are left wondering how to nuance care to obtain the best outcomes. We seek advice from our more experienced partners and sometimes we call our mentors to ask for their input. In this book, the editors have put together a series of chapters addressing colorectal diseases as if the authors had been asked to comment on a difficult case. This volume is a distillation of the clinical wisdom that has been built up over years of practice at the busiest colorectal department in the world.

In writing this book, the authors want to provide an easily accessible, understandable volume that makes phone calls to mentors and text messages to experts less common. Our authors have combined the wisdom they acquired from their own mentors with their personal clinical experience to complement the knowledge found in textbooks, reviews, and experimental studies. They describe the ways in which they dealt with tricky, dangerous, and unusual situations, to provide tips and techniques that you can use when faced with similar circumstances. Many of the tips described in this book are derived from a previous generation of experts, with advice that filters down over the years, constantly changing as understanding of disease and choices of medications and operative techniques expand, but based on the sound principles that have built a dynasty here in Cleveland. This is an unusual book, but an intensely practical one. We trust that you find it to be so.

James Church, MBChB, FRACS
Ian Lavery, MD

Cleveland, Ohio

PART I
In The Operating Room and Anatomy

Chapter 1

Anatomy of the Colon, Rectum, and Anus

RICHARD L. DRAKE
JENNIFER M. MCBRIDE
MICHELLE D. INKSTER
JAMES S. WU

Surgical Anatomy, properly understood, implies not merely relation of parts, but such an acquaintance of the position, function and relations of the structures entering into the formation of any region, as may assist in the diagnosis and treatment of the injuries and diseases occurring in it; or in certain cases to judge how far operative interference is warrantable, and guide us, if it be, in planning and performing the operation.

Edward Bellamy, FRCS
The Student's Guide to Surgical Anatomy, 1885
Attributed to Professor Spence

The intestinal tract begins at the duodenum and ends at the anus.

Peritoneum

The intestines are enveloped variably in peritoneum (Fig. 1-1). In his 1903 syllabus of surgical anatomy, Thomas describes the peritoneum as follows:

Peritoneum. The peritoneum is a closed serous sac, having no external communication, except in the female through the Fallopian tubes. It intervenes between the abdominal wall and the viscera, which are

intraperitoneal only in the sense that they invaginate the posterior layer. The viscera are *held in position by* the folds of peritoneum or mesenteries thus formed. They may have a complete covering, except where the two layers of these folds meet, as in the case of the ileum and jejunum, the transverse colon, stomach and spleen. Often a viscus is only partly covered, as in the case of the kidney, bladder, ascending and descending colon.

Small Intestine

The small intestine consists of the duodenum, jejunum, and ileum (Fig. 1-2) and is open, except at its beginning (pylorus) and at its end (ileocecal valve).

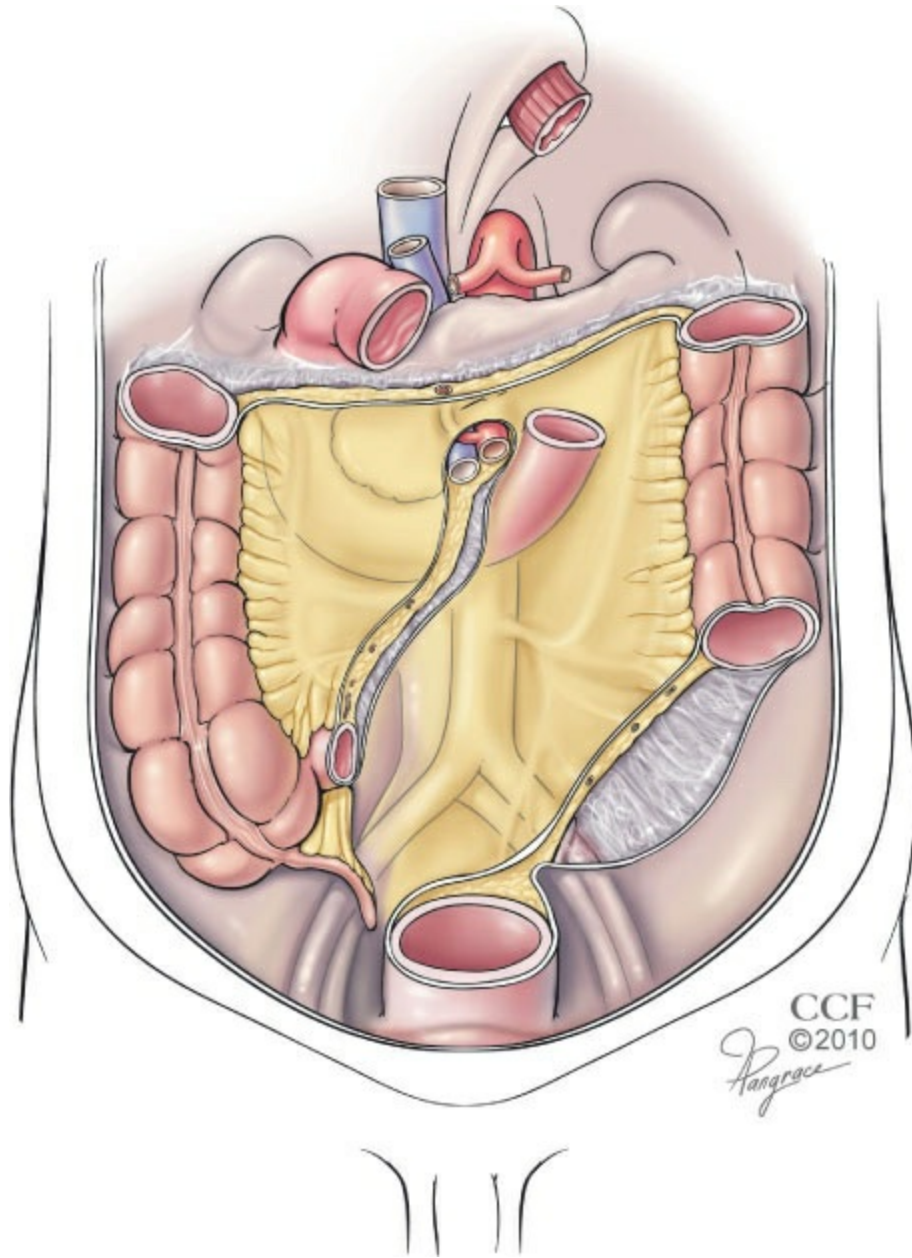


FIGURE 1-1 The peritoneum is a sac that covers the intestines, either completely or partially. Except for its first part, the duodenum is retroperitoneal. The jejunum, ileum, transverse colon, and sigmoid colon are covered by peritoneum and suspended on a mesentery. The ascending colon, the descending colon, and the rectum are partly covered.

Duodenum

The term “duodenum” is derived from the Latin *duodenum digitorum* (space of 12 digits) because its length is about the breadth of 12 fingerbreadths. The duodenum is the first section of the small intestine and, except for the first

part, is retroperitoneal. It is C-shaped and formed around the head of the pancreas (Fig. 1-3).

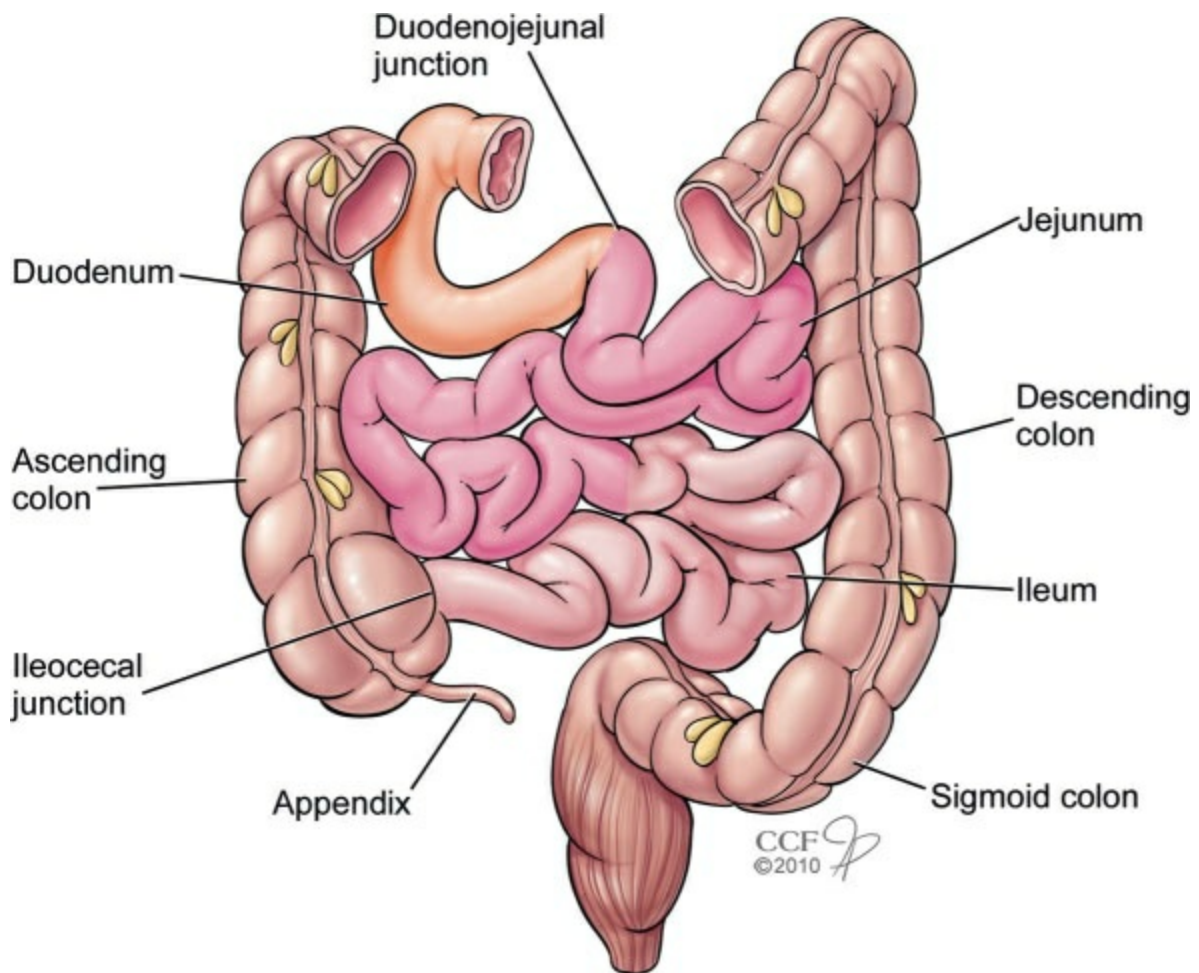


FIGURE 1-2 The small intestine is shown with its location relative to the large intestine.

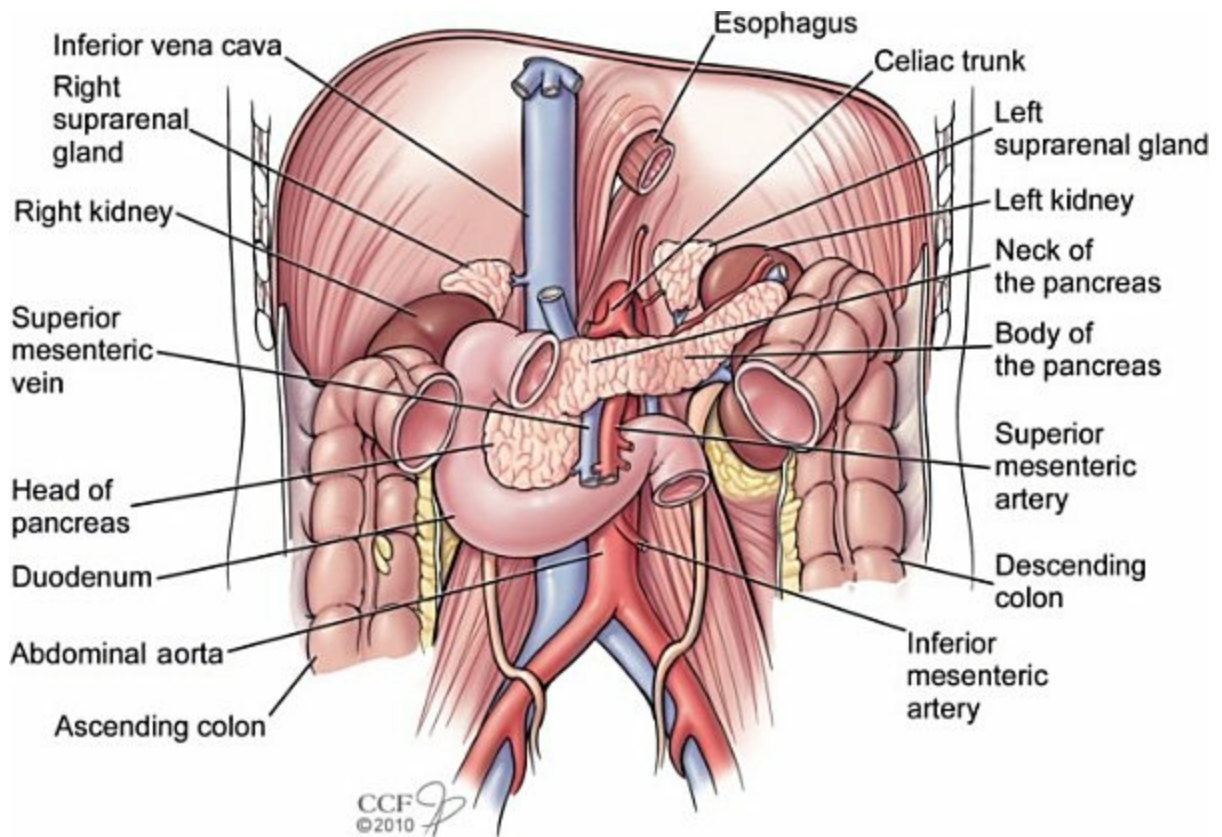


FIGURE 1-3 The duodenum is located in close proximity to the pancreas, hepatobiliary system, vena cava, portal vein, vertebral column, aorta, superior mesenteric vessels, urinary system, and the colon.

The duodenum is divided into four parts (Fig. 1-4) as follows.

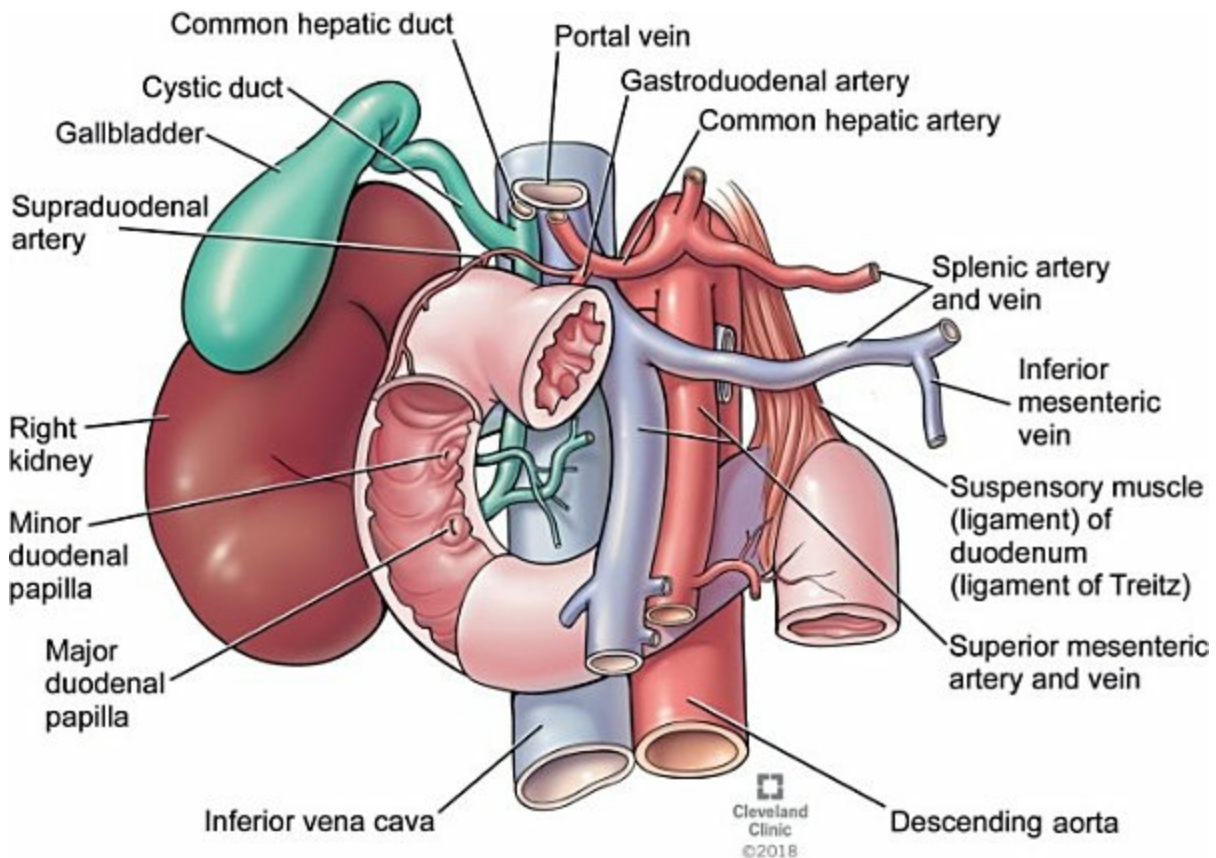


FIGURE 1-4 The duodenum and its relationship to the biliary system, vena cava, portal vein, and superior mesenteric artery/vein. The pancreas has been removed.

- ◆ The superior or first part begins at the pyloric sphincter and ends in the area of the neck of the gallbladder. It lies anterior to the bile duct, gastroduodenal artery, portal vein, and inferior vena cava.
- ◆ The descending or second part passes from the neck of the gallbladder to the inferior edge of vertebra L3. It is anterior to the medial portion of the right kidney and just lateral to the head of the pancreas. Associated with this part are the major duodenal papilla and minor duodenal papilla.
- ◆ The inferior or third part passes anterior to the inferior vena cava, abdominal aorta, and vertebral column, and its anterior surface is crossed by the superior mesenteric artery and vein.
- ◆ The ascending or fourth part is to the left of the abdominal aorta and passes upward, ending at the duodenojejunal junction. The ligament of Treitz (suspensory muscle/ligament of the duodenum) is associated with this junction.

The arterial supply to the duodenum is from the gastroduodenal artery, the

supraduodenal artery, duodenal branches from the anterior and posterior superior pancreaticoduodenal arteries, duodenal branches from the anterior and posterior inferior pancreaticoduodenal arteries, and the first jejunal branch from the superior mesenteric artery (Fig. 1-5).

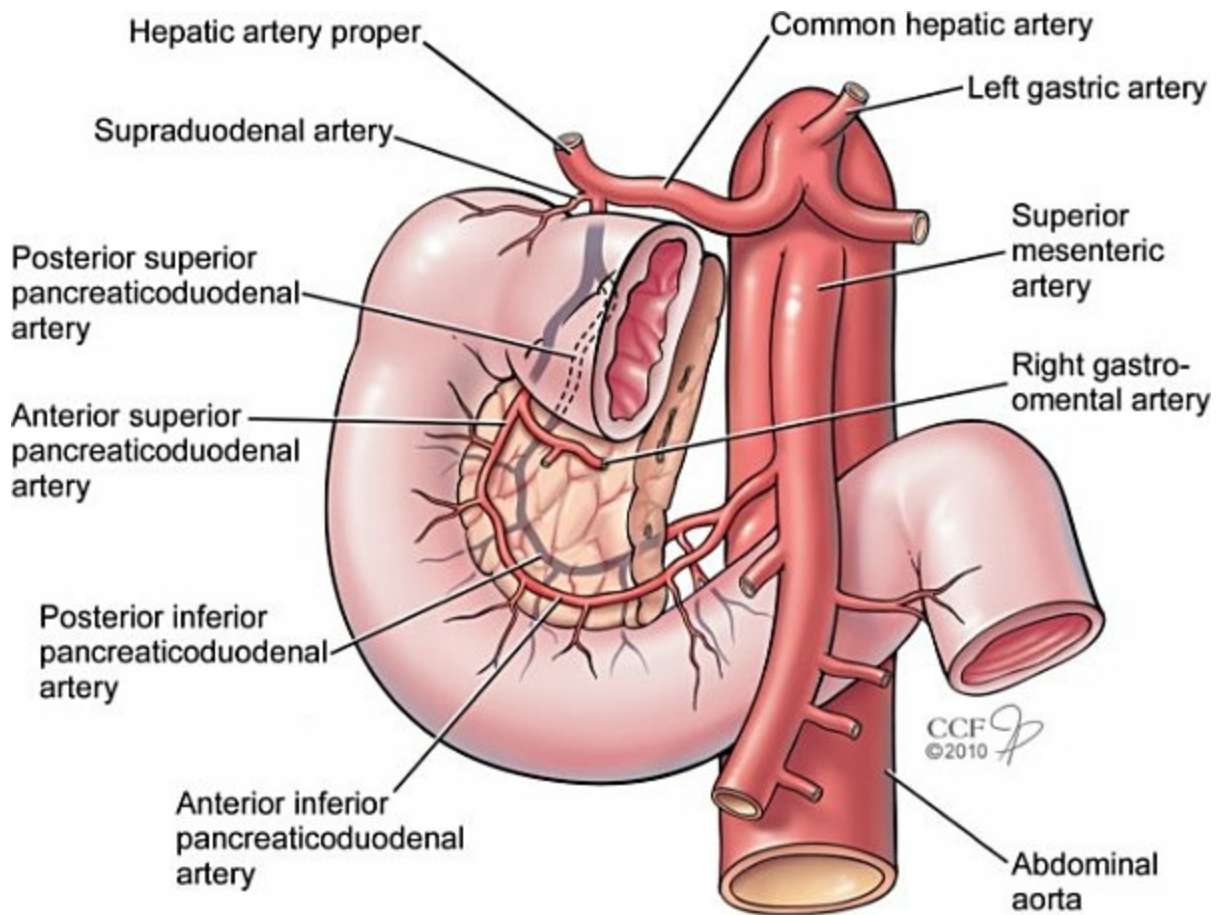


FIGURE 1-5 Details of the arterial supply to the duodenum.

Jejunum and Ileum

The jejunum and the ileum are completely covered by peritoneum and connected to the posterior abdominal wall by a mesentery. They travel from the left upper quadrant to the right lower quadrant.

Jejunum

The word “jejunum” is derived from the Latin *ieiunum* or “empty” because it is often found empty on dissections. The jejunum follows the duodenum and

represents about two-fifths of the small intestine. The arterial supply to this portion of the small intestine consists of jejunal arteries that are branches of the superior mesenteric artery (Fig. 1-6). Venous drainage is via the superior mesenteric vein.

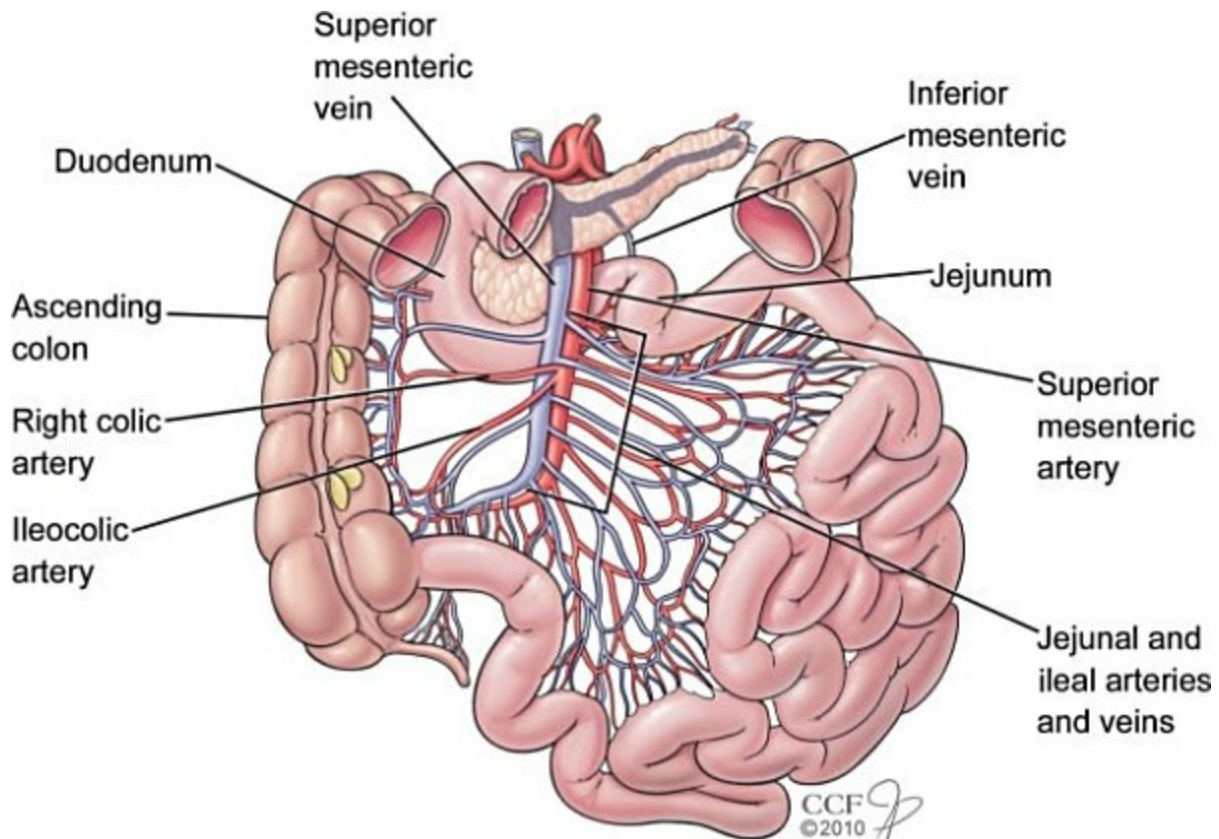


FIGURE 1-6 The jejunum and ileum are intraperitoneal structures that travel from the left upper quadrant to the right lower quadrant and suspended on a mesentery. The vascular supply is from the superior mesenteric artery and vein.

Ileum

The word “ileum” is derived from the Latin *ilia* for “groin” or “flank.” The ileum is the final portion of the small intestine and represents about three-fifths of this structure (Fig. 1-6). The ileum joins the large intestine at the junction of the cecum and the ascending colon. The arterial supply to this portion of the small intestine consists of ileal arteries from the superior mesenteric artery and an ileal branch from the ileocolic artery.

Large Intestine