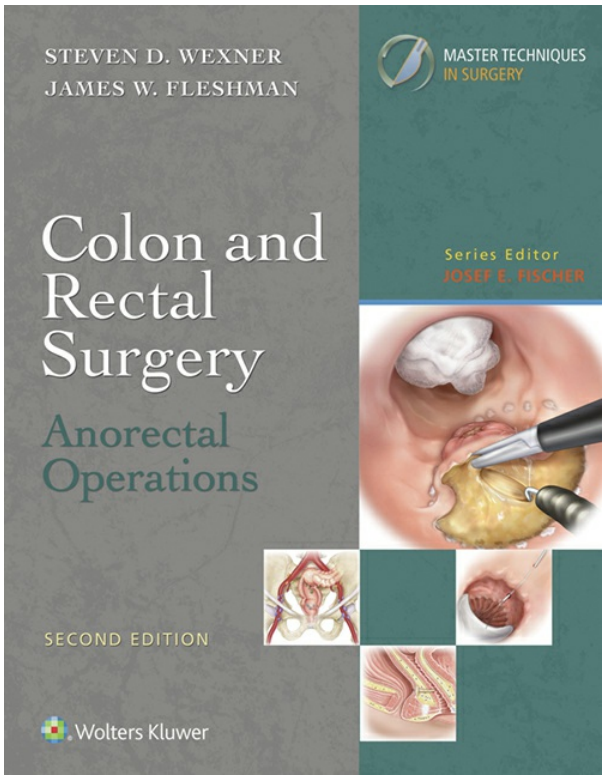
STEVEN D. WEXNER
JAMES W. FLESHMAN
MASTER TECHNIQUES IN SURGERY
Series Editor
JOSEF E. FISCHER
Colon and Rectal Surgery
Anorectal Operations
SECOND EDITION
Wolters Kluwer

Colon and Rectal Surgery

Anorectal Operations

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Anorectal Operations

SECOND EDITION

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MASTER TECHNIQUES IN GENERAL SURGERY

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Prepress Vendor: S4Carlisle Publishing Services

Second Edition

9 8 7 6 5 4 3 2 1

Printed in China

Library of Congress Cataloging-in-Publication Data

Names: Wexner, Steven D., editor. | Fleshman, James, editor.

Title: Colon and rectal surgery. Anorectal operations / edited by Steven D. Wexner, James W. Fleshman.
Other titles: Anorectal operations | Master techniques in surgery.
Description: Second edition. | Philadelphia : Wolters Kluwer, [2019] | Series: Master techniques in surgery
Identifiers: LCCN 2017044369 | ISBN 9781496348579 (hardback) | eISBN: 9781496348593
Subjects: | MESH: Rectal Diseases—surgery | Rectum—surgery | Anal Canal—surgery | Colon—surgery
Classification: LCC RD543.C57 | NLM WI 650 | DDC 617.5/547—dc23 LC record available at https://lccn.loc.gov/2017044369

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Dedication

This book is dedicated to my family: to my late father Ira and my mother Arlene, for all of the guidance that they have given me throughout my life. In addition to my sons Wesley and Trevor for although I have hopefully imparted knowledge to them, I have also acquired an inordinate amount of insight from them. Furthermore to my life-partner Dr. Mariana Berho, for her wisdom, counsel, and especially love. This dedication would be incomplete without thanking people besides my family. Thank you, Jim Fleshman, for decades of friendship during which we have collaborated on many endeavors, including this book. Thanks to the hundreds of alumni who have allowed me to try to help them help their patients. I hope that this book furthers your education and reminds you of your time at Cleveland Clinic Florida. Thank-you to my executive assistant, Debbie Holton, and my publications assistant, Elektra McDermott, for your patience, indulgence, assistance, and perseverance in this project and in many others before it.

Steven D. Wexner

One can never repay completely the incredible gift that my friends, colleagues, and acquaintances have contributed to this set of books. As time goes on, I would like to think that they will all look back with pride to see that is indeed a great contribution to the training and practice of colorectal surgery. Thank-you is not enough but is sincerely given to each one of you. Thanks to Steve Wexner for including me in this effort and to Dr. Josef Fischer for his trust. I would like to dedicate this book to my wife Linda, who has tolerated my mental absences throughout many of the last year's weekends and evenings to edit these chapters. While I am sure she will never read these books, she has contributed support and tolerance. Jennifer Hernandez, in our department at Baylor University Medical Center, deserves special mention for her ability and patience to read my edits on each manuscript and for keeping track of the whole process. Thanks to you.

James W. Fleshman

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Foreword to the First Edition

We live in a high-technology world where the "miracles" of modern surgery make headline news around the globe. It is no longer surprising to hear of yet another start-up medical technology company that promises a new surgical device that will save countless lives, improve outcomes, and significantly decrease pain and suffering. People find themselves mesmerized by watching "key hole surgery" broadcast in high definition to their home television and find it surprisingly elegant and bloodless compared with their prior mental picture of surgeons at work. So it is perhaps understandable that many patients today go online to find surgeons and institutions offering the newest approaches and latest technology. It seems as though the modern surgeon armed with high-tech devices and digitalized equipment should be invincible. Indeed, it is easy for surgeons to be inappropriately swept up by the siren song of technical innovation.

In this kind of world, one might question the utility of yet another surgical textbook, especially one devoted to operative technique. Fortunately, editors Steven Wexner and James Fleshman have created a unique publication that is a far cry from the traditional textbook of the past. The list of contributing authors includes seasoned master surgeons schooled in traditional techniques and highly innovative researchers and entrepreneurs who are exploring new frontiers of surgical technology. Over the course of their busy clinical careers, the editors themselves have successfully bridged both perspectives. Their unique experiences are apparent in this new, tightly edited and highly practical textbook that emphasizes tried and true open techniques and new, less invasive techniques.

Drs. Wexner and Fleshman understand that surgical outcomes are dependent on many factors including clinical acumen and mature judgment to guide individualized decision making. But they also know that surgeons must master basic operative skills and develop a full reservoir of different techniques that can be used to fit the demands of the case at hand. As importantly, they know that no matter how revolutionary or exciting, technology has its limits. Innovation is providing new tools, but it is the surgeon's skill in deciding what tools to use and the way in which they are used that determines the surgical outcome. Operative technique remains critical to minimize patient morbidity, cure cancer and other life-threatening conditions, and preserve function and quality of life. All colon and rectal surgeons will find this book to be a valuable adjunct to their practice. The artist's color drawings are superb and anatomically correct. The text is easy to read, very focused, and useful for busy surgeons. I congratulate the editors for bringing this book to us.

David A. Rothenberger
August 1, 2011

Foreword

Surgery is both an art and a science, and there is no substitute for acquiring both knowledge and skill to the highest level for the best outcomes for our patients. When we talk about mastering a subject, we mean just this. Mastery comes from repeating and refining a procedure until it is as good as we can get it. In this we need the help and guidance of master surgeons, and these excellent two volumes provide just that. In this second edition, the techniques have been brought right up to date with step-by-step descriptions of the essential operations in colorectal surgery by carefully chosen experts in their field. It is lavishly illustrated, and there is access to a companion website with an image bank and videos of the procedures. Steve Wexner and Jim Fleshman have done a great job in revising and renewing this outstanding couple of volumes in the Master Techniques series.

Neil Mortensen
Oxford, United Kingdom
August 7, 2017

Preface to the First Edition

The Mastery of Colorectal Surgery textbook is a two-volume compendium that demonstrates virtually all of the currently employed techniques for abdominal and anorectal surgery. All of the chapters have been written by internationally acclaimed experts, each of whom was given literary license to allow the book to be more creative and less rigorously formatted. Although some techniques are self-explanatory and the authors therefore concentrated their verbiage upon results and controversies surrounding a particular technique, other procedures are described in a more algorithmic manner. Specifically, some techniques require a much more heavily weighted description of preoperative and/or postoperative parameters rather than intraoperative variables. The matching of illustrations and videos has also been tailored to suit the needs of each chapter. Because of the quantity of material, the book is divided into two volumes: one that includes the abdominal and one that includes anorectal procedures. While many textbooks vie for the attention of surgeons in training and surgeons in practice, the Mastery series, edited by Dr. Josef Fischer, has established itself as the resource for expert management of each theme. Therefore, this book was deliberately crafted to augment rather than to replace several other excellent recently published textbooks. It is our hope that these volumes be used in that context so that the reader can learn the fundamentals and basics using many other excellent source materials and then rely upon the Mastery of Colorectal Surgery books for more clarity in terms of review of very specific procedures. In that same manner, these books perform a ready preoperative resource before embarking upon individual procedures.

We wish to thank Josef Fischer for having entrusted us with this latest of his literary offspring. The project took a considerable amount of time and effort, and we certainly thank him for his patience. In addition, we thank our respective staff in Weston and in Saint Louis, especially Liz Nordike, Heather Dean, Dr. Fabio Potenti, and Debbie Holton for their extensive efforts as well as Nicole Dernoski at Wolters Kluwer. We wish to express our sincerest and deepest gratitude to each and every contributor for their time, attention, expertise, and commitment to the project. Without our individual chapter authors, this work would not exist. We know that each of them has many significant competing obligations for their limited time and thank them for having participated to such an important degree in this project. Last, our appreciation goes to our families for their love and support as it is always time away from them that allows us to produce these type of books. In particular, appreciation goes to Linda Fleshman and to Wesley and Trevor Wexner.

Steven D. Wexner

James W. Fleshman

Preface

Six years have elapsed since we published the two volumes of Master Techniques in General Surgery on colorectal surgery including anorectal operations and abdominal operations. Content with the overwhelming popularity of that book, we are pleased and proud to offer you this second edition. We are indebted to the authors and coauthors of the 117 chapters in these two volumes. We hope that you will agree with us that these two volumes provide beautifully illustrated and authoritatively written chapters about virtually every currently practiced colorectal surgical technique.

We have endeavored to make each chapter relatively focused rather than broad and the authors have, as requested, presented clinically relevant material that can be readily digested. We have deliberately avoided publishing a comprehensive compendium about each subject. Thus, many areas are addressed with multiple chapters each of which has its own very specific view and offers clinical guidance on the basis of practical expertise. While the preferences of the authors vary, many facets within these two volumes are quite consistent including the world-renowned nature of the authors and coauthors, the consistently high quality of the art work, and the style of the chapters. We hope that readers will again, as was the case with the first edition, find the second edition of these two volumes to be an excellent clinical resource often consulted for both patient management and academic endeavors.

We again thank the authors and coauthors of these 117 chapters for their time, efforts, energy, expertise, and cooperation with the author guidelines, which enabled us to offer you this second edition.

Steven D. Wexner

James W. Fleshman

Contents

PART I

HEMORRHOIDECTOMY

Chapter 1

Ferguson Hemorrhoidectomy

Anthony J. Senagore

INDICATIONS/CONTRAINDICATIONS

The most frequent symptoms leading to surgical intervention for hemorrhoidal sufferers are bleeding, protrusion, and anorectal discomfort and pain.

- Bleeding typically bright red blood (noted on the toilet paper or dripping into the commode).
- Occasionally massive bleeding with very large internal hemorrhoids.
- Prolapse of hemorrhoids usually with bowel movements and may spontaneously reduce, require manual reduction, or be irreducible depending on stage; typically either too large for rubber band ligation or have failed rubber band ligation.
- Severe, constant pain is usually related to acute thrombosis of internal or external hemorrhoids and associated with a palpable perianal mass.

There are a few contraindications to performing a Ferguson hemorrhoidectomy in a patient in addition to medical contraindications to a surgical procedure, the presence of ulcerative colitis or Crohn's disease, or portal hypertension. A history of pelvic radiotherapy can be considered a relative contraindication as well.

PREOPERATIVE PLANNING

Components include:

- Examination of the patient with hematochezia requires inspection of the perianum, anoscopy, and either rigid proctoscopy or flexible sigmoidoscopy. Colonoscopy can be reserved based upon patient history, age, or suspicious symptomatology.
- The author prefers examination in the modified Sim's position (left lateral decubitus with knees drawn toward the chest and lower legs extended). This approach allows relative patient comfort, while allowing the clinician to perform all components of the anorectal examination.
- A careful digital examination of the anal canal and distal rectum and prostate in men.
- Anoscopy to clearly inspect the hemorrhoidal tissue and anal canal with assessment of size, degree of prolapse, and bleeding tendency. Assessment of the three standard columns (right anterior, right posterior, and left lateral).
- Proctoscopy/flexible sigmoidoscopy to exclude neoplasia or inflammation.

Decision to operate

- The decision to proceed to excisional hemorrhoidectomy requires a mutual choice by the physician and patient that medical and nonexcisional options have either failed or are not appropriate.
- Surgery is typically employed when the primary symptom is significant, intractable hemorrhoidal prolapse, associated with large external skin tags that impair anal hygiene.
- Preoperative preparation is minimal if the patient is generally healthy and the procedure is typically ambulatory.
- The patient on therapeutic anticoagulation should be managed in conjunction with the managing physician to control the risk of hemorrhage postoperatively.
- The procedures are usually performed in the operating theater after preoperative phosphate enema to clear the distal rectum of stool.
- The modified Sim's position is the preferred position by the author.
- Anesthetic selection is usually left to the anesthesiologist and patient; however, local anesthesia supplemented by the administration of intravenous narcotics and propofol is highly effective and short acting.
- Avoid spinal anesthesia due to risk of urinary retention.
- It is important to communicate with the anesthesiologist to limit intraoperative fluids to <500 ml to reduce the risk of postoperative urinary retention.
- Administer preemptive analgesia with nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, and gabapentin prior to arrival for surgery and the same regimen can be continued postoperatively.

SURGERY

Instrumentation for excisional hemorrhoidectomy:

- The classic instrument of performance of an excisional hemorrhoidectomy has been cold scalpel with or without scissor dissection. The approach is highly effective and of low cost compared with other devices. A variety of energy devices have been used with varying claims of superior speed, reduced bleeding, and less pain. Each of the devices adds expense which in the current reimbursement milieu can very negatively impact economic efficiency compared with the scalpel/scissor technique. The data remain highly debated and the author's preference is to use cold steel.
- Nd-YAG laser—Although capable of excising hemorrhoidal tissue, the device was found to be slower, more costly, and actually delayed healing of the wound leading to increased pain and is no longer relevant for this procedure.
- Monopolar electrocautery—The device is an effective excisional tool capable of improved hemostasis compared with a scalpel. It can allow transection of the hemorrhoidal pedicle without suture ligation at the expense of greater tissue trauma due to lateral thermal spread.
- Ligasure TM (Medtronic, Minneapolis, MN)—A bipolar cautery device capable of simultaneous tissue division and sealing and blood vessel coagulation. The method attempts to duplicate the Ferguson approach, but there may be inconsistent tissue coaptation. The proposed benefits of faster OR times, sutureless technique, and less pain have not been clearly documented.
- Harmonic scalpel—The device employs a rapidly reciprocating blade to generate heat for coagulation and tissue transection. The device is relatively expensive and has not demonstrated significant clinical advantages to offset that cost, primarily due to the associated thermal tissue injury.

Patient Positioning

The author's preferred position for Ferguson hemorrhoidectomy is the left lateral, modified Sim's position. This position allows for easy surgical access to the anal canal while allowing anesthetizing with an easy access to the airway. At the end of the case, the patient can be quickly and safely rolled back onto their gurney for transport to the recovery area. Some surgeons including the editors prefer the prone jackknife position that allows surgeons and assistants room to operate on each side of the patient.

Surgical Technique

- The Hill Ferguson retractor is inserted to sequentially assess the right posterior, right anterior, and left lateral columns. The excisions can be limited to only the pathologically enlarged columns (1, 2, and/or 3 may be excised; Fig. 1-1).

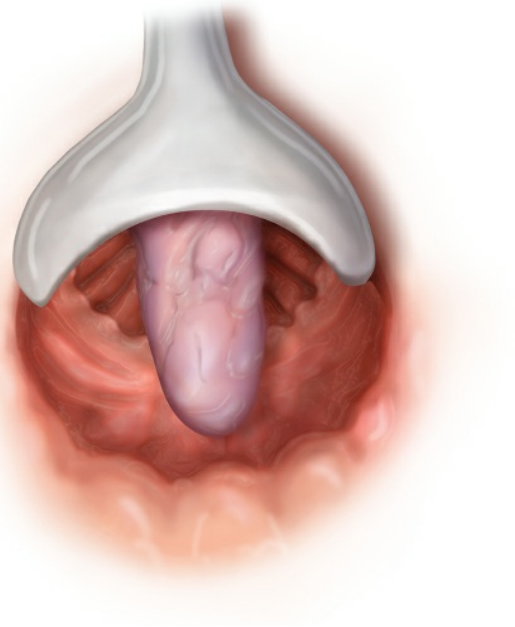

FIGURE 1-1 The Hill Ferguson retractor is positioned in the anal canal to demonstrate the entire length of the enlarged hemorrhoidal column.

- The largest of the pathologic columns should be addressed first as excision. Wound closure may reduce the size of the adjacent columns by either reducing the volume of the next excision or obviating further excision.

- The enlarged column should be grasped at its base with a Debakey forceps to assure that the anoderm will be tension free (Fig. 1-2).

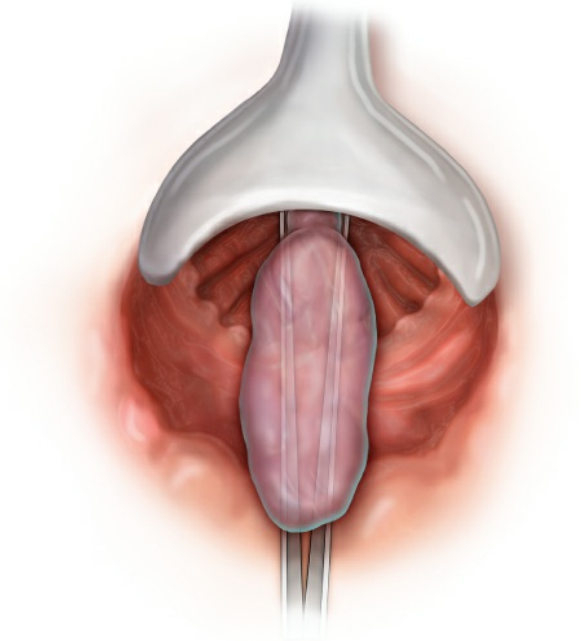

FIGURE 1-2 The hemorrhoidal column is compressed at the base with a Debakey forceps to ensure that the anoderm can be approximated without undue tension. The incision should be shaped like an hourglass, with the narrowed portion centered at the level of the anoderm to minimize excision of this tissue to reduce the risk of stricture.

- A 10 scalpel blade is used to incise the hemorrhoid column in an hour glass fashion with the waist of the hour glass centered at the anoderm to minimize excision of tissue at this level of the anal canal. Widening the incision at the top of the hemorrhoidal column assures adequate excision of the internal hemorrhoidal complex. Similarly, a wider excision of skin reduces the risk of skin tags postoperatively.
- The hemorrhoidal column is then dissected from the surface of the internal sphincter using Mayo scissors up to the pedicle (Fig. 1-3).

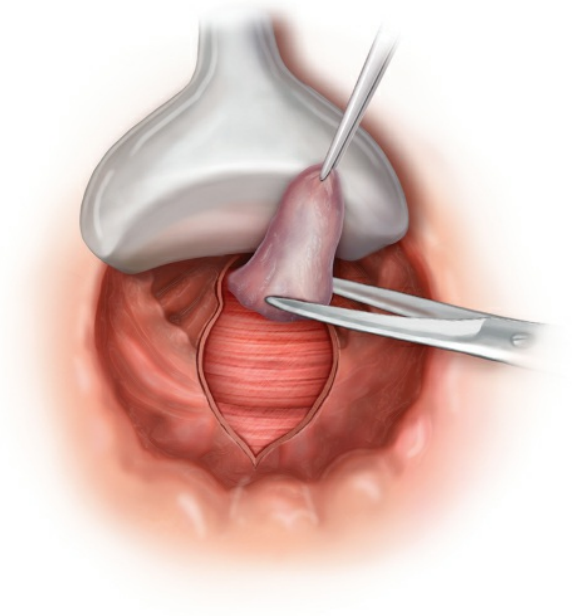

FIGURE 1-3 The hemorrhoidal pedicle is dissected off the surface of the internal anal sphincter up to the level of the pedicle.

- The pedicle is grasped with a large Kelly clamp allowing transection of the hemorrhoid.
- The pedicle is suture ligated using 3-0 Vicryl on a CT 2 needle. A deeper suture fixation of the pedicle is repeated to assure fixation of the pedicle above the level of the anorectal ring to reduce the risk of recurrence of symptoms due to pedicle prolapse (Fig. 1-4).

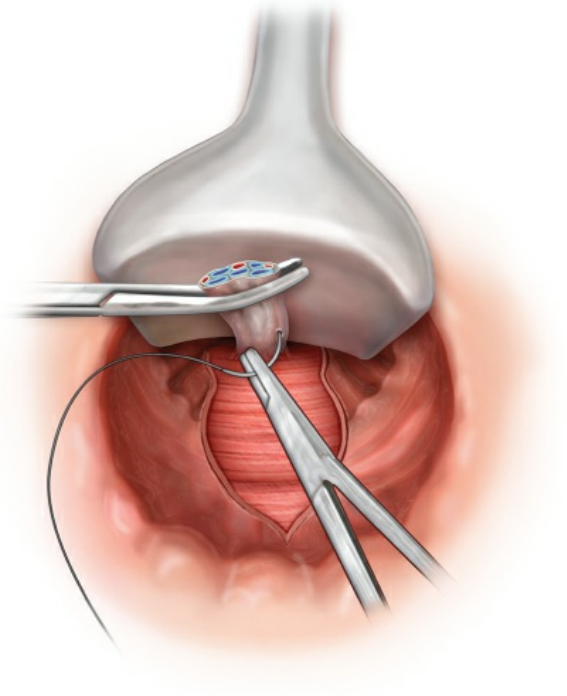

FIGURE 1-4 The hemorrhoidal pedicle is doubly ligated with 3-0 Vicryl suture at the top of the anorectal ring to reduce the risk of recurrent prolapse.

- The same Vicryl suture is used to close the rectal mucosa, anoderm, and perianal skin in sequence. It is only necessary to place every third stitch into the internal anal sphincter to help reduce pain. This will allow adequate closure of dead space (Fig. 1-5).

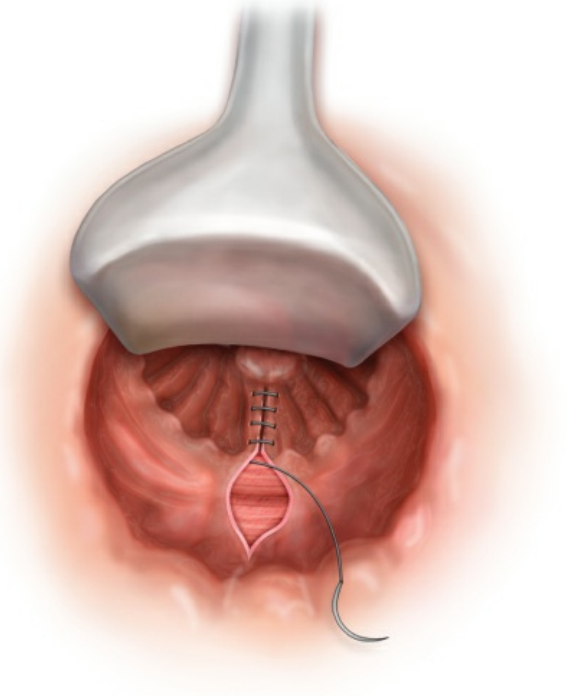

FIGURE 1-5 The pedicle suture is used to perform a running closure of the entire length of the wound.

POSTOPERATIVE MANAGEMENT

Pain remains the most challenging component of postoperative care following excisional hemorrhoidectomy.

- The optimal analgesic regimen should begin with the accurate infiltration of bupivacaine into the wounds and the perianal skin' although its use has been variably successful in long-term pain reduction. Liposomal bupivacaine has been employed for this procedure in particular, with suggestions of superior analgesia; however, this benefit is gained at a significant cost per case.
- NSAIDs (nonsteroidal anti-inflammatory drugs), especially ketorolac, have been very efficacious in managing posthemorrhoidectomy pain. The relative benefit of preoperative oral loading with naprosyn that can be continued postoperatively is also very effective and inexpensive.
- The home-going oral pain control regimen for narcotic sparing analgesia should include 300 mg gabapentin q8h, acetaminophen 650 mg q6h, and naprosyn 500 mg q12h.
- The patient can be provided a small prescription for oral narcotics for break-through pain management.

Urinary retention is another frequent posthemorrhoidectomy complication. Agents such as parasympathomimetics or α-adrenergic blocking agents may be beneficial. However, the use of sitz baths for comfort, effective analgesia, and the limitations of perioperative fluid administration to 500 ml may be a more effective approach.

Bowel management is very important to avoid fecal impaction or pain due to constipation. The author generally recommends an early return to normal diet, nightly use of an oral magnesium laxative for several days, and daily psyllium fiber supplement.

COMPLICATIONS

Delayed hemorrhage following excisional hemorrhoidectomy is not totally preventable but fortunately occurs in less than 2% of cases, and presentation is usually from days 5 to 10 postoperatively. The patient should be instructed to return immediately upon recognition with strong consideration for return to the operating room with resuturing of the wounds. The situation can be temporized by bladder catheter tamponade using a 60-ml balloon catheter placed intrarectally and pulled into the anal canal. Consistent tension or traction is required to slow blood loss.

Surgical site infection is amazingly rare with this operation but it has been reported. Typically when it does occur the wound dehisces, which may actually relieve the situation. Occasionally, the patient can develop a deeper abscess with the risk of developing a perianal abscess/fistula in ano. However, this complication is almost in the reportable case report range.

The best review of the technique was the large review of the Ferguson experience by Ganchrow et al in 1971. The data showed that bleeding and/or hemorrhoidal prolapse was the primary indication for hemorrhoidectomy.

- 80% were 3 column; and 17% 3 column with undermining of intervening anoderm to clear intermediate hemorrhoidal tissue
- Fissurectomy was performed in 21% of cases and sphincterotomy in 12% of cases
- Early complications included: minimal bleeding, 2%; bleeding with return to OR, 1.3%; and abscess, 0.2%
- Late complications: fissure, 2.7%; anal stenosis, 1.1%; abscess/fistula, 0.9%

RESULTS

In addition to the Ganchrow article mentioned earlier, there have been several meta-analyses comparing Ferguson technique to the two most common competitors: Milligan Morgan and circular stapled techniques. The message remains that the closed technique is economically efficient and highly effective in the long term for symptom relief with a low risk of complications. Compared with the open technique, both short-term healing and long-term functionality appear superior. Although circular stapled technique can be effective, it is more expensive, it is associated with more surgical complications and a higher recurrence rate, and reports of persistent pain after the procedure have resulted in withdrawal of the instrument from the market.

CONCLUSIONS

The Ferguson closed hemorrhoidectomy has stood the test of time as the gold standard for symptomatic prolapsing hemorrhoids not able to be managed with nonoperative techniques. The operation can be effectively performed with scalpel/scissor technique with minimal complications, both short and long term. There is little need to add expensive energy technology. Effective pain control postoperatively and bowel management will speed the patients' recovery.

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Chapter 2

Hemorrhoidectomy Using a Bipolar Electrothermal Device (BED) and Vibratory (Harmonic) Energy (VE)

William C. Cirocco, Guy R. Orangio, Kurt G. Davis, and Syed G. Husain

"Having got the anus to protrude as much as possible, foment with hot water, and then cut off the extremities of the hemorrhoids."

—Hippocrates ~400 B.C.[1]

INDICATIONS/CONTRAINDICATIONS

Since Hippocrates the quest for a painless, bloodless hemorrhoidectomy has been an elusive goal for surgeons. For decades, the scalpel, scissors, or electrocautery has been the gold standard tools utilized for excisional hemorrhoidectomy. Efforts to decrease the amount of intraoperative bleeding, postoperative pain and disability following hemorrhoidectomy have led to the introduction of alternative energy devices to dissect and excise hemorrhoid tissue. The LigaSure (computer-guided bipolar electrothermy device [BED]) and the Harmonic Scalpel (vibratory energy [VE]) are two alternative energy sources that have improved hemostasis and reduced postoperative pain and disability.

The computer-guided BED combines the pressure applied by the jaws of the forceps with the energy tailored to tissue impedance supplied by a platform generator. An automatic advanced feedback system incorporates intelligent sensors that recognize tissue changes 200 times/second and consequently adjust the output current and voltage based on the power setting to maintain a constant effect across the different tissue densities and resistance. A very high-frequency current provides hemostasis by denaturing collagen and elastin from the vessel wall and the surrounding connective tissue. Because of the high-frequency current and active feedback control over the power output, it has the potential to ensure complete coagulation and seal the hemorrhoidal tissue between the forceps of the instrument with minimal collateral thermal spread and tissue char to the adjacent tissue, resulting in decreased postoperative pain with a faster recovery and return to normal daily activities. BED maintains an appropriate balance of energy and pressure to induce the melting of collagen and elastin resulting in tissue seal, including blood vessels up to 7 mm in diameter. The seal of denatured protein has strength comparable with that of suture. The head of the device has been engineered with "heat sink" capacity to ensure a cool surface (<45°C). Histologic studies and in situ thermal imaging confirm negligible evidence of thermal damage with lateral spread calculated at 1–2 mm. After the completion of coagulation is signaled by the feedback sensor, the tissue is incised along the middle of the line of coagulum. The difference and improvement over conventional bipolar systems is that BED uses low-voltage and high current resulting in the cold-cutting of tissues with the temperature of the forceps never exceeding 50–80°C.

The VE consists of cutting shears that vibrate at 55,500 Hz, at amplitudes of 60–100 μm; results in disruption of hydrogen bonds that cause denaturing of intracellular proteins. This mechanism results in shearing of the coapted tissue and creation of a "sticky" hemostatic coagulum that assists in hemostasis. The VE has two modalities of cutting tissue:

Pressure results from compression (coaptation) of the "vibratory" blade onto a "static" pressure pad on the opposite blade of the shears. The combination of focused pressure and VE optimizes division of the coapted tissue. The combination of these energy modalities allows the tissue to be divided at a lower temperature than electrocautery, thus minimizing lateral thermal injury. The decreasing lateral thermal injury may result in less postoperative pain after hemorrhoidectomy.

These two energy sources BED and VE, combine focused pressure with energy sources that enhance hemostasis and decrease lateral tissue injury thereby decreasing bleeding and postoperative pain thus diminishing postoperative disability. Utilizing these types of energy sources will result in minimal intraoperative bleeding, allowing for a clear operative field and improved visualization for complex hemorrhoid disease. Since the first edition of this textbook, these instruments are more ergonomic, enhancing user comfort and functionality, minimizing user fatigue (Fig. 2-1).