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Benign Anorectal: Hemorrhoids

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Anatomy

Hemorrhoids are cushions of specialized, highly vascular tissue found within the anal canal in the submucosal space. The term “hemorrhoidal disease” should be reserved for those vascular cushions that are abnormal and cause symptoms in patients. These cushions of thickened submucosa contain blood vessels, elastic tissue, connective tissue, and smooth muscle.¹ The anal submucosal smooth muscle (Treitz’s muscle) originates from the conjoined longitudinal muscle (see [Figure 11-1](#)). These smooth muscle fibers then pass through the internal sphincter and anchor themselves into the submucosa, thereby contributing to the bulk of the hemorrhoids and suspending the vascular cushions at the same time.² Some of the vascular structures within the cushion when examined microscopically lack a muscular wall. The lack of a muscular wall characterizes these vascular structures more as sinusoids and not veins. Studies have shown that hemorrhoidal bleeding is arterial and not venous because hemorrhage from disrupted hemorrhoids occurs from presinusoidal arterioles that communicate with the sinusoids in this region.¹ This is supported by the bright red appearance and the arterial pH of the blood.³ The venous plexus and sinusoids below the dentate line which constitute the external hemorrhoidal plexus drain primarily via the inferior rectal veins into the pudendal veins which are branches of the internal iliac veins. Venous drainage also occurs to a lesser extent via the middle rectal veins to the internal iliac veins. This overlying tissue is somatically innervated and is therefore sensitive to touch, pain, stretch, and temperature. The subepithelial vessels and sinuses above the dentate line which constitute the internal hemorrhoid plexus are drained by way of the middle rectal veins to the internal iliacs.

The vascular cushions within the anal canal contribute to anal continence and function as a compressible lining that protects the underlying anal sphincters. Additionally, the cushions are critical in providing complete closure of the anus, further aiding in continence. As an individual coughs, strains, or sneezes, these fibrovascular cushions engorge and maintain closure of the anal canal to prevent leakage of stool

in the presence of increased intrarectal pressure. These cushions account for approximately 15%–20% of the anal resting pressure.⁴ Additionally, this tissue likely supplies important sensory information that enables individuals to discriminate between liquid, solid, and gas, further aiding in continence. It is essential to consider that while undertaking any treatment for hemorrhoidal disease the fibrovascular cushions are a part of normal anorectal anatomy and are important in the continence mechanism. Therefore, surgical removal may result in varying degrees of incontinence particularly in individuals with marginal preoperative control. There are three main vascular cushions that are found anatomically in health as well as in disease. The cushions are located in the left lateral, right anterior, and right posterior positions of the anus. This specific configuration has been shown in cadaver studies to be present only 19% of the time.¹ Most individuals have additional smaller accessory cushions present in between the main cushions. This anatomic configuration apparently bears no relationship to the terminal branching of the superior rectal artery. The position of hemorrhoids within the anal canal, however, remains remarkably consistent. The configuration of these cushions is quite constant and borne out by the fact that the same configuration can be found in children, the fetus, and even in the embryo.¹ The topographic location of pathology around the anus should be described in anatomic terms (anterior, posterior, right lateral, left lateral, etc.) and not by the numbers on the face of a clock. In this way, regardless of whether the patient is in a prone, supine, or lateral position, the pathology can always be accurately located.

Etiology

Etiologic factors thought to be contributory to the pathologic changes in the vascular cushions include constipation, prolonged straining, irregular bowel habits, diarrhea, pregnancy, heredity, erect posture, absence of valves within the hemorrhoidal sinusoids, increased intraabdominal pressure with

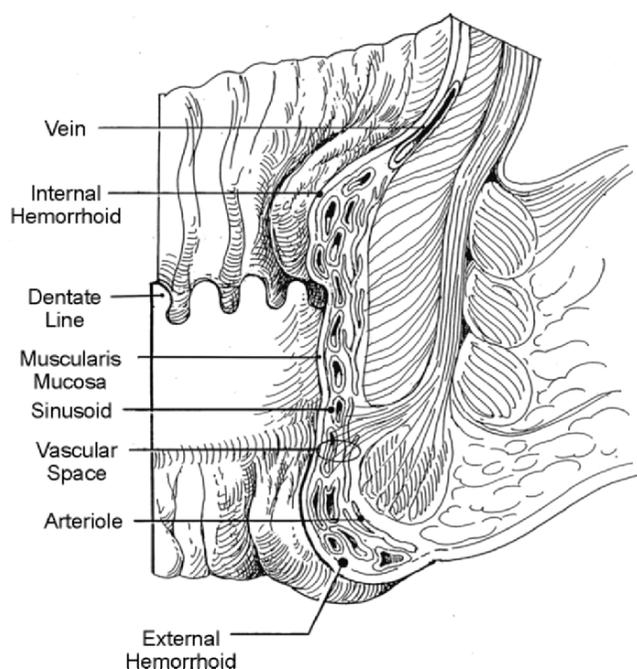


FIGURE 11-1. Anal cushion showing Treitz's muscle derived from the conjoined longitudinal muscle of the anal canal.

obstruction of venous return, aging (deterioration of anal supporting tissues), and internal sphincter abnormalities. Patients with hemorrhoid disease have been shown to have increased anal resting pressures when compared with controls.^{5,6} This increased resting pressure returns to normal after hemorrhoidectomy, but it is unclear whether the hemorrhoids are the cause of this increase.⁷ Manometry also shows the presence of increased ultra slow waves in patients with hemorrhoid disease but the exact significance of this is unclear.⁸ In pregnant women, approximately 0.2% require an urgent hemorrhoidectomy for incarcerated and prolapsed hemorrhoids.⁹ Rigorous proof of the theories mentioned, however, is lacking. One of the most important etiologic theories is the "sliding anal cushion theory."¹ Thompson concluded that a sliding downward of the anal lining is responsible for the development of hemorrhoids. Repeated stretching of the anal supporting tissues (submucosal Treitz's muscle and elastic connective tissue framework) which normally functions to anchor and suspend the anal canal lining causes fragmentation of the supporting tissues and subsequent prolapse of the vascular cushions. Furthermore, straining and irregular bowel habits may be associated with engorgement of the vascular cushions making their displacement more likely. This theory is further supported by histologic studies that have shown deterioration of the anal supporting tissues by the third decade of life.¹⁰ Additionally, vascular changes that seem to be associated with the development of hemorrhoids include increased arteriovenous communications, vascular hyperplasia, and increased neovascularization with increased CD105 immunoactivity.^{3,5,11}

Epidemiology

The reported prevalence of hemorrhoids in the United States is 4.4%, peaking between the ages of 45 and 65. Increased prevalence rates are seen in Caucasians and in individuals with higher socioeconomic status.¹² Whether this is secondary to differences in health-seeking behavior rather than true prevalence remains to be proven. The prevalence of hemorrhoids is reported to have decreased during the later half of the 20th century; however, this is based on population-based surveys and needs to be interpreted with caution because it reflects self-reporting of symptoms without corroboration via physical examination.¹³

Classification

Hemorrhoids are divided into two types, external and internal. External hemorrhoids are located in the distal one-third of the anal canal, distal to the dentate line, and are covered by anoderm (modified squamous epithelium lacking any skin appendages) or by skin. Internal hemorrhoids are located proximal to the dentate line and are covered by columnar or transitional epithelium. Because this overlying tissue is viscerally innervated, it is not sensitive to touch, pain, or temperature, making it easily amenable to office procedures. Internal hemorrhoids are further subclassified into degrees based on size and clinical symptoms as initially reported by Banov et al.¹⁴ (see Table 11-1). Mixed or combined hemorrhoids are defined as the presence of both internal and external hemorrhoids.

Symptoms

Patients with anal complaints from whatever etiology frequently present at the office complaining of "hemorrhoids or piles." Many patients referred or coming into the office complaining of "hemorrhoids" frequently are found to have other anal problems such as pruritus ani, anal fissures, fistulas, and skin tags. A careful history and physical examination including anoscopy by an experienced individual is mandatory and will frequently lead to the correct diagnosis. The presence, quantity, frequency, and timing of bleeding and prolapse should be noted. Patients with hemorrhoid disease may complain of bleeding, mucosal protrusion, pain, mucus, discharge, difficulties with perianal hygiene, a sensation of incomplete evacuation, and cosmetic deformity.^{5,15} A thorough dietary and medication history should also be done because certain medications, diets, and or dietary indiscretions cause or exacerbate constipation or diarrhea.

Symptoms from external hemorrhoids are usually secondary to thrombosis and physical examination shows a tender, bluish-colored lump at the anus distal to the dentate line associated with acute pain. Thrombosed external hemorrhoids can bleed secondary to pressure necrosis and subsequent

TABLE 11-1. Classification of internal hemorrhoids

	First degree	Second degree	Third degree	Fourth degree
Finding	Bulge into the lumen of the anal canal ± painless bleeding	Protrude at the time of a bowel movement and reduce spontaneously	Protrude spontaneously or with bowel movement, require manual replacement	Permanently prolapsed and irreducible
Symptoms	Painless bleeding	<ul style="list-style-type: none"> • Painless bleeding • Anal mass with defecation • Anal burning or pruritus 	<ul style="list-style-type: none"> • Painless bleeding • Anal mass with defecation • Feeling of incomplete evacuation • Mucous leakage • Fecal leakage • Perianal burning or pruritus ani • Difficulty with perianal hygiene 	<ul style="list-style-type: none"> • Painless or painful bleeding • Irreducible anal mass • Feeling of incomplete evacuation • Mucous leakage • Fecal leakage • Perianal burning or pruritus ani • Difficulty with perianal hygiene
Signs	<ul style="list-style-type: none"> • Bright red bleeding • Bleeding at end of defecation • Blood drips or squirts into toilet • Bleeding may be occult 	<ul style="list-style-type: none"> • Bright red bleeding • Prolapse with defecation 	<ul style="list-style-type: none"> • Bright red bleeding • Blood drips or squirts into toilet • Prolapsed hemorrhoids reduce manually • Perianal stool or mucous • Anemia extremely rare 	<ul style="list-style-type: none"> • Bright red bleeding • Blood drips or squirts into toilet • Prolapsed hemorrhoids always out • Perianal stool or mucous • Anemia extremely rare

ulceration of the overlying skin. External skin tags are folds of skin that arise from the anal verge. These tags may be the end result of prior episodes of thrombosed external hemorrhoids. Enlarged skin tags or external hemorrhoids may interfere with anal hygiene leading to perianal burning or pruritus.

Internal hemorrhoids are painless unless thrombosis, strangulation, gangrene, or prolapse with edema occurs. Despite what is written, patients will frequently come to the office complaining of “painful hemorrhoids” even when none of these conditions exist. Once other sources of pain are ruled out, careful inquiry regarding the description of their pain further elucidates that patients frequently describe their anal pain as “burning” in nature. This may be secondary to perianal irritation from mucous or fecal leakage leading to secondary pruritus ani. Bleeding from internal hemorrhoids is bright red and associated with bowel movements. The bleeding usually occurs at the end of defecation. The patient may complain of blood dripping or squirting into the toilet or blood on the toilet tissue. Bleeding may also be occult leading to guaiac-positive stools or rarely to anemia. Prolapse of the hemorrhoid cushions may manifest itself as an anal mass, mucous discharge, or a sensation of incomplete evacuation. The examiner should ascertain whether the hemorrhoids reduce spontaneously or require manual reduction.

Differential Diagnosis

Because most patients that come into the office or emergency room with anal symptomatology complain of “hemorrhoids,” it is important to rule out other causes (see Table 11-2). If the patient’s main complaint is anal pain, then other diagnoses should routinely be sought unless thrombosis or prolapse of hemorrhoids is obvious. The causes of pain are almost invariably found in pathology distal to the dentate line, i.e., fissure, abscess, fistula, external hemorrhoid thrombosis, or prolapsed thrombosed internal hemorrhoids.

Examination

After a general patient assessment, the patient is ideally examined in the prone jackknife position on a proctologic table. Patients with a history suggestive of hemorrhoid disease with an unremarkable examination in the prone jackknife position should be examined in a sitting position on the commode while asking the patient to strain. Oftentimes, pathology is uncovered when gravity assists in the examination. In patients who are unable to tolerate the jackknife position (morbidly obese, pregnant, elderly, patient with knee or hip

TABLE 11-2. Differential diagnoses

	Acute pain	Chronic pain	Bleeding	Pruritus or discharge	Lump or mass
Possible diagnoses	<ul style="list-style-type: none"> • Fissure • Abscess • Fistula • Thrombosed hemorrhoid 	<ul style="list-style-type: none"> • Fissure • Abscess • Fistula • Anal stenosis • Anal Crohn’s • Thrombosed hemorrhoid 	<ul style="list-style-type: none"> • Fissure • Polyps • Colorectal cancer • Inflammatory bowel disease • Proctitis • Internal hemorrhoids • Ruptured thrombosed external hemorrhoid 	<ul style="list-style-type: none"> • Fistula • Anal warts • Anal incontinence • Rectal prolapse • Pruritus ani • Hypertrophied anal papilla • Prolapsed hemorrhoid 	<ul style="list-style-type: none"> • Abscess • Skin tags • Anal tumor • Rectal tumor • Rectal polyps • Rectal prolapse • Anal Crohn’s • Prolapsed anal papilla • Thrombosed or prolapsed hemorrhoid

joint pathology, pulmonary disease) or when a proctologic table is not available, examination should be performed in the modified left lateral (Sims) position. The location of all anal pathology is described anatomically (anterior, posterior, left lateral, right lateral, etc.) and not by the numbers on the face of a clock. In this way, the pathology can easily be located regardless of what position the patient is in. Calmly reassure your patients at the start of the examination and routinely discuss what you are about to do before actually carrying out anal inspection, palpation, digital rectal examination, anoscopy, and proctoscopy, which should be performed on all patients if feasible.

Gentle spreading of the buttocks allows careful inspection of the squamous portion of the anal canal as well as the perianal, genital, perineal, and sacrococcygeal regions. Skin tags, external hemorrhoids, fissures, fistulas, infection, hemorrhoid prolapse, mucosal prolapse, rectal prolapse, tumors, skin lesions, thrombosis, and rashes all can be diagnosed on careful visual inspection if present. Palpation of the perianal region can localize pain, tenderness, induration, or masses. Digital examination gently performed localizes pain, masses, abscesses, and assesses sphincter tone. Anoscopy permits visualization of the anoderm and internal hemorrhoidal cushions. Anoscopy is best performed with a side-viewing anoscope especially when hemorrhoid ligation is being considered. A multi-slotted anoscope is also available and was developed to facilitate the synchronous exposure and placement of multiple hemorrhoid bands without the need to reposition the anoscope. This may offer less postligation pain and decreased need for repeat ligation in comparison to the conventional anoscope for banding.¹⁶ Although the degree of prolapse may be ascertained if the patient is asked to strain, a more accurate assessment of prolapse can be made if inspection takes place while the patient is sitting and straining on a commode. Proctoscopy or flexible sigmoidoscopy must be performed when possible to assess the rectum and lower colon for neoplasms and inflammatory bowel disease.

At a minimum, all patients with anorectal complaints must undergo anoscopy, rigid proctosigmoidoscopy, and/or flexible sigmoidoscopy and further work-up depends on findings at physical examination, patient age, and history. Although patients may be too uncomfortable to undergo these procedures at the initial visit, it is important that they are performed before discharging the patient from your care. Sole reliance on a patient's description of hematochezia to make a diagnosis is inaccurate and further workup is warranted.¹⁷ Practice guidelines from the American Society for Gastrointestinal Endoscopy and the Society for Surgery of the Alimentary Tract suggest, at a minimum, anoscopy and flexible sigmoidoscopy for bright-red rectal bleeding.¹⁸ Total colon examination via colonoscopy or air-contrast barium enema is indicated when no source is evident on anorectal examination, the bleeding is atypical for hemorrhoids, anemia or Hemoccult-positive stool is present, or significant risk factors for colonic neoplasia exist (age, family history, or personal

history of polyps).^{18–20} Because hemorrhoids are rarely the cause of anemia (0.5 patients/100,000 population), total colon examination is indicated even in the very young patient.^{21,22} Patients less than 40 years of age with hemorrhoid disease compatible with their symptomatology probably require no further work-up. Patients older than 40 years of age with minimal hemorrhoid disease, additional symptoms, or positive family history for colorectal cancer should undergo a total colon examination with either a colonoscopy or double contrast barium enema to identify other etiologies for bleeding that are not obvious on initial examination.

Treatment

Treatment for symptomatic internal hemorrhoids varies from simple reassurance to operative hemorrhoidectomy. Treatments are classified into three categories: 1) dietary and lifestyle modification; 2) nonoperative/office procedures; and 3) operative hemorrhoidectomy. In general, less symptomatic hemorrhoids, such as those that cause only minor bleeding, can be treated with simple measures such as dietary modification, change in defecatory habits, or office procedures. More symptomatic hemorrhoids such as third or fourth degree are more likely to require operative intervention.

Dietary and Lifestyle Modification

Because prolonged attempts at defecation, either secondary to constipation or diarrhea, have been implicated in the development of hemorrhoids, the main goal of this treatment is to minimize straining at stool. This is usually achieved by increasing fluid and fiber in the diet, recommending exercise, and adding supplemental fiber agents (psyllium) to the diet in patients unable to consume sufficient amounts of fiber in their diets. Despite common teaching, little good evidence exists regarding the benefit of fiber in preventing or managing hemorrhoid disease. Reduced hemorrhoidal bleeding has been shown with the use of psyllium in a double-blind, placebo controlled trial; however, other studies are less favorable.^{23–26} Psyllium works in conjunction with water to add moisture to the stool and subsequently decrease constipation. Psyllium may also be therapeutic in treating diarrhea. It may add bulk to liquid stools therefore increasing the consistency and decreasing the volume. Dietary modification with fiber supplementation (psyllium, methylcellulose, calcium polycarbophil) is one of the mainstays of therapy for patients with hemorrhoidal disease. In the majority of cases, symptoms of bleeding and pain improve over a 6-week period. A diet high in fiber (20–35 g/day) including the consumption of plenty of fruits and vegetables is recommended especially if the patient has a history of constipation or straining. A common problem with fiber supplementation is noncompliance because of either poor palatability or symptoms of bloating, increased flatus, and abdominal cramps. Compliance is improved by

TABLE 11-3. Fiber supplements

Type of fiber	Trade name	Available fiber
Psyllium	Metamucil™	3.4 g/teaspoon
	Metamucil capsules™	0.52 g/capsule
	Konsyl™	6.0 g/teaspoon
Methylcellulose	Citrucel™	2.0 g/dose
Calcium polycarbophil	FiberCon™	0.5 g/capsule
	Konsyl fiber tablets™	0.5 g/tablet

starting at lower doses and slowly increasing the quantity of fiber ingested until the desired stool consistency is achieved. Some common fiber products currently available are listed in Table 11-3. If dietary modification fails to relieve symptoms, then further therapy is indicated (see Table 11-4).

Frequently, a change in defecatory habits will resolve symptoms. Oftentimes, simply asking an individual to curtail reading on the commode resolves the hemorrhoidal symptoms. Lifestyle and dietary modifications along with ruling out proximal sources of bleeding are all that is required for the majority of patients complaining of hemorrhoidal disease.

Medical Therapy

Rigorous levels of evidence do not exist to support the use of topical therapies, whether physical or pharmacologic (sitz baths, anesthetics, phlebotonics, corticosteroids, or ice). Most studies have used poor methods with lack of controls, multiple associated components, and heterogeneous preparations. Therefore, firm recommendations cannot be made at the time of the writing of this chapter. Cochrane reviews on related registered Cochrane titles are listed in Table 11-5.²⁷⁻²⁹

Despite the lack of any rigorous evidence, probably the most effective topical treatment for the relief of symptoms comes in the way of warm (40°C) sitz baths. Soaking time should be limited (15 minutes) to prevent edema of the perianal and perineal skin. The application of ice packs to the anal region also may relieve symptoms and is acceptable provided that contact time is not prolonged. Pharmaceutical preparations such as creams, ointments, foams, and suppositories have little pharmacologic rationale in the management of hemorrhoidal disease. Suppositories never remain within the anal canal and usually end up in the lower rectum where they may provide an emollient effect or lubrication to the stool. Popular topical soothing agents are frequently combined with corticosteroids and or anesthetics. Although individuals may report empirical symptomatic benefit with their use, patients must be advised against prolonged use because of possible local allergic effects or sensitization of the skin.

There have been several phlebotonics that have been evaluated in the literature. Citrus bioflavonoids and related substances are widely used in Europe to treat diseases of the blood vessels and lymph system, including hemorrhoids, chronic venous insufficiency, leg ulcers, easy bruising, nosebleeds, and lymphedema after breast cancer surgery. These compounds are thought to work by strengthening the walls of blood vessels, increasing venous tone, lymphatic drainage, and normalizing capillary permeability. The major bioflavonoids found in citrus fruits are diosmin, hesperidin, rutin, naringin, tangeretin, diosmetin, narirutin, neohesperidin, nobiletin, and quercetin. Flavonoids are reported to have numerous health benefits. They are the natural pigments in fruits and vegetables. Our body cannot produce bioflavonoids. Diosmin (Daflon) is

TABLE 11-4. Management of internal hemorrhoids by classification

Treatments	First degree	Second degree	Third degree	Fourth degree	Acute prolapse with thrombosis
Dietary	X	X	X	X	X
Banding	X	X	X	X	
Sclerotherapy	X	X	X		
Infrared coagulation	X	X	X		
Excisional hemorrhoidectomy			X	X	Emergent
Stapled hemorrhoidopexy		X	X	X (?)	
Multiple thrombectomies and multiple bandings					X

TABLE 11-5. Registered Cochrane review titles on hemorrhoid management

Cochrane review title	Author	Primary aim
Laxatives and topical treatments for hemorrhoids ²⁷	Alonso-Coello and Lopez-Yarto ²⁷	To determine the efficacy of laxatives and topical treatments in improving the symptoms derived from symptomatic hemorrhoids
Nonoperative treatment for hemorrhoidal disease ²⁸	Thaha, Campbell, and Steele ²⁸	To determine the long-term therapeutic efficacy of various non-operative treatment methods in controlling hemorrhoidal symptoms
Phlebotonics for hemorrhoids ²⁹	Alonso, Johanson, Lopez-Yarto, ²⁹ and Martinez	To determine the efficacy of phlebotonics in improving the symptoms derived from symptomatic hemorrhoids
Circular stapled anopexy versus excisional hemorrhoidectomy for the treatment of hemorrhoidal disease	Thaha, Campbell, Staines, Nyström, Steele ¹⁸⁰⁻¹⁸²	To assess stapled anopexy with excisional methods

probably the best studied but has not been approved for use in the United States.³⁰⁻³² Other phlebotonics include:

Natural products: flavonoids,^{33,34} rutosides³⁵⁻³⁷ (troxerutin, buckwheat herb extract, *Ruscus aculeatus*), diosmine, hidrosmin, ginkgo biloba, saponosides; escin (horse chestnut seed extract).

Synthetic products: calcium dobesilate, naftazone, aminaftone, chromocarbe, and others: iquinoso, flunarizine, sulfomucopolysaccharide.

Calcium dobesilate (calcium 2,5-dihydroxybenzenesulfonate) is a drug with previously demonstrated efficacy in the treatment of diabetic retinopathy and chronic venous insufficiency. These beneficial effects of the drug are related to its ability to decrease capillary permeability, platelet aggregation, and blood viscosity and to increase lymphatic transport. A randomized, double-blind, controlled study was conducted to investigate the efficacy of oral calcium dobesilate therapy in treating acute attacks of internal hemorrhoids. Twenty-nine well-documented adult patients with first- or second-degree internal hemorrhoids were treated with calcium dobesilate for 2 weeks, whereas 16 patients received only a high-fiber diet to serve as control. The symptom and anoscopic inflammation scores obtained with calcium dobesilate treatment were significantly better than those with diet only ($P = .0017$ and $P = .0013$, respectively). Together with recommendations about diet and bowel discipline, oral calcium dobesilate treatment provided efficient, fast, and safe symptomatic relief from acute symptoms of hemorrhoidal disease. This symptomatic healing is associated with a significant improvement in the anoscopically observed inflammation.³⁸ Symptomatic improvement has been shown in other studies but results are not always consistent, especially when fiber is included.^{30-32,39}

Office Treatments

Rubber Band Ligation

Rubber band ligation is a method of tissue fixation and one of the most widely used techniques in the United States. It can be used to treat first-, second-, and third-degree internal hemorrhoids. The most common method currently in use for the outpatient treatment for hemorrhoids was originally described by Barron⁴⁰ in 1963. He reported satisfactory results in 150 patients, the majority of which were treated in the outpatient setting. The rubber band is placed on the redundant mucosa a minimum of 2 cm above the dentate line which causes strangulation of the blood supply to the banded tissue, which sloughs off in 5-7 days leaving a small ulcer that heals and fixes the tissue to the underlying sphincter. Rubber band ligation is frequently recommended for individuals with first- or second-degree hemorrhoids and, in some circumstances, third-degree hemorrhoids.

Several commercially available types of hemorrhoid ligators are available including a suction ligator (McGownTM,

Pembroke Pines, FL) (see Figure 11-2A) that draws the hemorrhoid tissue into the ligating barrel via suction, and closing the handle inserts a band around the hemorrhoid.⁴¹ The advantage of this ligator is that only one hand is required for placement of the band, making an assistant unnecessary for the procedure. The disadvantage of the suction ligator is that the ligating barrel is smaller than other ligators, hence less tissue is banded. With the conventional ligators, an atraumatic clamp is used to draw hemorrhoid tissue into the barrel of the ligator and a small rubber band is placed (see Figure 11-2B). A disadvantage compared with the suction ligator is that two hands are required for placement of a band necessitating an additional assistant for the procedure. An advantage is that a greater amount of excess hemorrhoid tissue can be eliminated with these ligators. Ligation of internal hemorrhoids using an endoscopic variceal ligator has been shown to be safe and reportedly controls bleeding and prolapse in approximately 95% and 90% of patients, respectively, with a major complication rate of less than 4%.⁴²⁻⁴⁴ Malposition of bands utilizing the endoscopic ligator approach requiring their removal has been reported as high as 5% in patients.⁴³ Cost effectiveness of this endoscopic ligation procedure has not been compared with hemorrhoid banding with traditional instruments. An alternative device developed for hemorrhoid banding consists of a disposable syringe-like hemorrhoid ligator, invented to

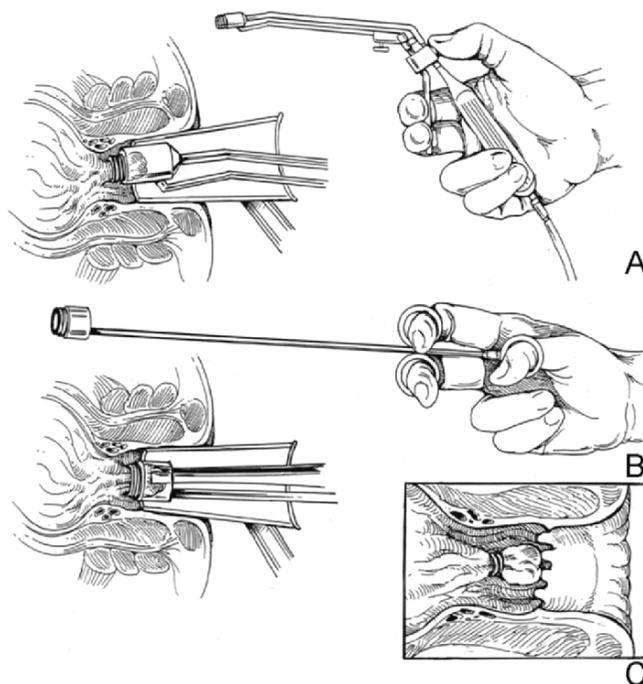


FIGURE 11-2. Banding an internal hemorrhoid. **A** The internal hemorrhoid is teased into the barrel of the ligating gun with a McGown suction ligator, or **B** a McGivney type ligator. **C** The apex of the banded hemorrhoid is well above the dentate line in order to minimize pain. (Reprinted from Beck D, Wexner S. Fundamentals of Anorectal Surgery. 2nd ed. Copyright 1998, with permission from Elsevier.)

simplify the banding procedure for both patient and surgeon⁴⁵ (see Figure 11-3). This single-operator ligator, with its own suction mechanism, was designed for use without the need of an assistant or an anoscope. By pointing the ligator directly toward the appropriate site and by measuring the distance from the anal margin using reference markings on the ligator, the bands can be placed accurately in a blind manner inside the rectum for the treatment of symptomatic internal hemorrhoids. Before the band is discharged, rotating the ligator 180

degrees while applying suction will alert the operator if the application site is not appropriate. O'Regan⁴⁵ reported a 97% success rate with two major complications (one episode of bleeding and one of perianal sepsis) in 480 patients.

Rubber band ligation can be performed safely with the patient in various positions; however, the prone jackknife position provides the best exposure. Anesthesia is not required for this procedure. Rectal preparation with enemas is not required but may be used if desired. A standard

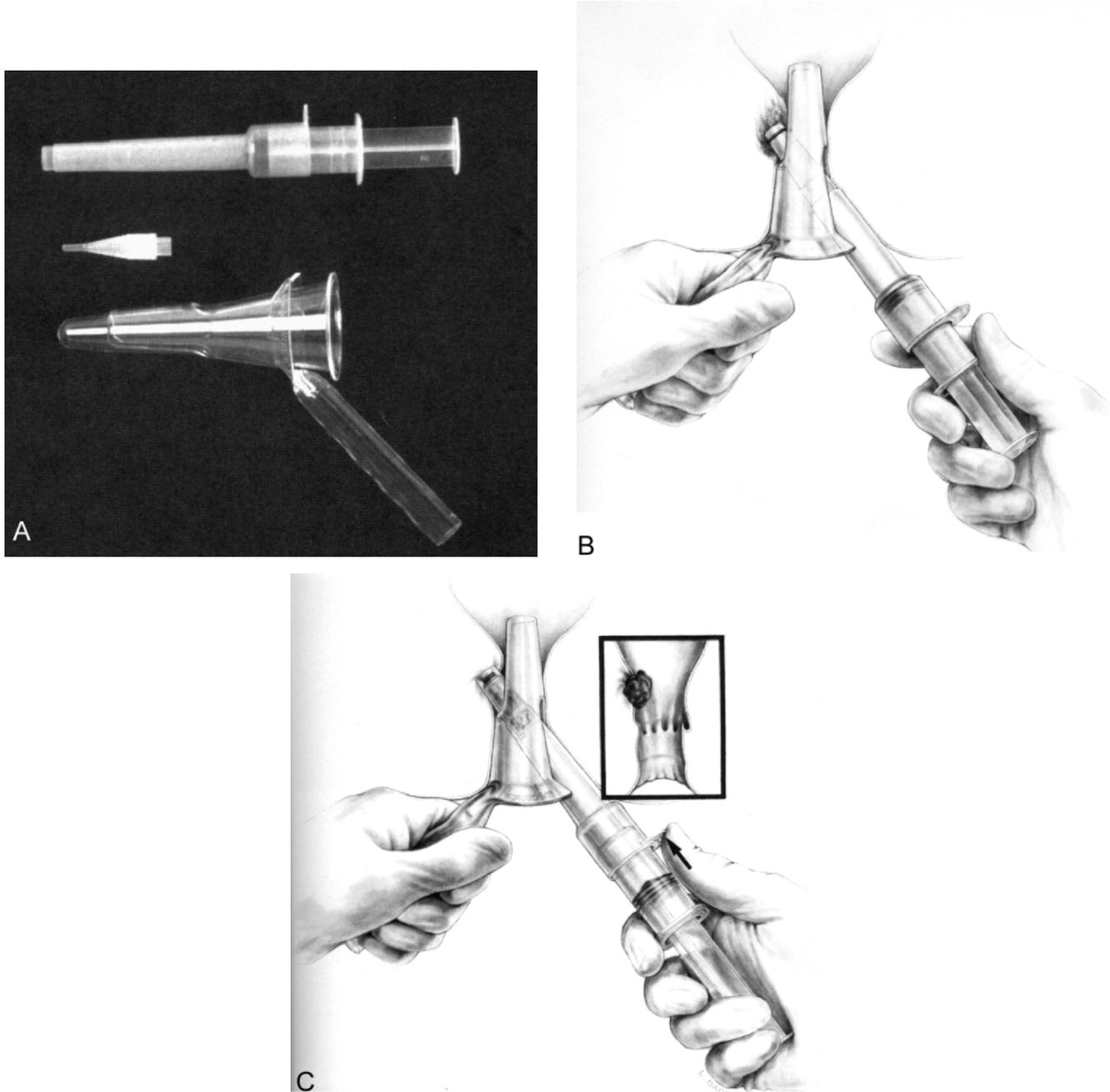


FIGURE 11-3. A O'Regan disposable banding system (Medsurge Medical Products Corp., Vancouver, Canada). B, C Technique of internal hemorrhoid ligation using the O'Regan ligating system.

commercially available ligator, good lighting, and a slotted anoscope are all that is required. The largest hemorrhoid bundle is routinely banded first. A single or double band is placed on one hemorrhoid bundle. Care is taken to place the band at least 2–3 cm above the dentate line approximately at the level of the anorectal ring or apex of the hemorrhoid. It is imperative to avoid banding too close to the dentate line or incorporating internal sphincter into the ligator because this can potentially lead to severe pain or pelvic sepsis. It has been shown that multiple hemorrhoid groups can be banded at a single session with no significant increase in morbidity when compared with single ligation.^{16,46–50} Some surgeons prefer banding one group initially to monitor patient response and then perform multiple bandings at a subsequent session if the initial banding was well tolerated.

Patients are instructed that normal activities may be resumed immediately after banding and they may experience a feeling of incomplete evacuation or anal pressure. Approximately 5–7 days after the procedure, the banded tissue sloughs off at which time the patient may notice a small amount of bleeding. Patients should be advised to avoid aspirin or platelet-altering drugs after banding for a period of 7–10 days to minimize delayed hemorrhage; however, there is no level I evidence to support this recommendation. It is an absolute contraindication to band patients on sodium warfarin or heparin therapy because subsequent sloughing of tissue may lead to massive hemorrhage.

Complications of hemorrhoid banding include pain, thrombosis, bleeding, and life-threatening perineal or pelvic sepsis. The most common complication of rubber band ligation is pain, which is reported in 5%–60% of patients.^{21,48,51–53} Pain is usually minor and relieved with sitz baths and analgesics. A dull, persistent ache is common for the first 1–2 days after banding. Significant anal pain is rare but is often secondary to a malpositioned rubber band placed too close to the dentate line. If the pain is experienced immediately after the banding, then the rubber band can be removed with a hooked cutting probe or hooked scissors. The subsequent development of aching pain is generally treated with sitz baths and analgesics. Constipation should be avoided during this period because it has been shown to worsen the outcome of rubber band ligation.⁵⁴ Rarely, hemorrhoid banding can result in thrombosis of internal and external hemorrhoids resulting in significant pain. Bleeding when it occurs is generally minor and occurs immediately after banding or 7–10 days later when the band falls off. Massive bleeding is a rare occurrence but may require operative intervention to control persistent hemorrhage. This may be minimized by having patients withhold aspirin or other nonsteroidals during the postbanding period. Other complications such as abscess, thrombosis, band slippage, priapism, and urinary dysfunction occur in less than 5% of patients.⁵⁵ There have been several reported cases of life-threatening perineal and/or pelvic sepsis after hemorrhoid banding.^{56–58} This necrotizing perineal or pelvic sepsis is rare but mandates emergent attention. The triad of increasing pain,

fever, and urinary dysfunction or retention either alone or together suggests the diagnosis.⁵⁹ These patients require intensive care unit admission, intravenous antibiotics, emergent examination under anesthesia, and debridement of all necrotic tissue. The risk of necrotizing infection seems to be increased in individuals with immune compromised states, including patients with uncontrolled acquired immunodeficiency syndrome, neutropenia, and severe diabetes mellitus.⁶⁰ Although the evidence is anecdotal in nature, caution is recommended in selecting these patients for rubber band ligation treatment.

Success rates with rubber band ligation will vary depending on length of follow-up, degree treated, and criteria for success.^{21,49,53,61} Approximately two-thirds to three-quarters of all individuals with first- and second-degree hemorrhoids respond to banding although this may need to be repeated at a later date.^{54,62,63} More than one banding session is usually required. The majority of patients experience relief of symptoms without further treatment. As previously mentioned, hemorrhoids can be banded at a single session or at multiple sessions. A retrospective study comparing single versus multiple banding identified greater discomfort (29% versus 4.5%) and more vasovagal symptoms (12.3% versus 0%) with multiple hemorrhoids being banded at a single session.⁴⁹ Bat et al.⁵⁵ prospectively studied complications in 512 patients undergoing hemorrhoid banding. Minor complications developed in 4.6% of patients including pain, band slippage, mucosal ulcer, and priapism. Hospitalization for major complications was necessary in 2.5%, and included massive hemorrhage, severe pain, urinary retention, and perianal sepsis. Savioz et al.⁶² investigated relapse rates after banding in 92 individuals. They found 23% of patients required repeat banding over 5 years and 32% at 10 years, and believed hemorrhoid banding to be a durable procedure. Bayer et al.⁶⁴ followed 2934 patients banded over a 12-year period. Seventy-nine percent required no further therapy, whereas 18% required repeat banding because of recurrence. Hemorrhoidectomy was necessary in 2.1% related to persistent symptoms.

Infrared Photocoagulation, Bipolar Diathermy, and Direct-Current Electrotherapy

These techniques rely on coagulation, obliteration, and scarring which eventually produce fixation of the hemorrhoid tissue. Infrared photocoagulation utilizes infrared radiation generated by a tungsten-halogen lamp applied onto the hemorrhoid tissue through a solid quartz light guide⁶⁵ (Redfield Corporation, Montvale, NJ) (see [Figure 11-4](#)). The infrared coagulator light is converted to heat which coagulates tissue protein and evaporates water from cells leading to inflammation, eschar formation, and eventual scarring which assists in fixation of the hemorrhoid group.

The amount of destruction depends on the intensity and the duration of application. The procedure is performed by applying the tip of the infrared coagulator near the apex of the



FIGURE 11-4. Infrared coagulator IRC2100™ (Redfield Corporation, Rochelle Park, NJ).

hemorrhoid for a 1.0- to 1.5-second pulse of energy. Approximately three to four applications per hemorrhoid are performed and one to three hemorrhoids undergo treatment per session.⁵³ The application of the tip to the hemorrhoid produces a 3- to 4-mm²-diameter area of coagulation with a depth of penetration of approximately 2.5 mm that ulcerates and scars in 2 weeks providing fixation of the hemorrhoid and cessation of bleeding⁶⁶ (see Figure 11-5). Complications are very infrequent and may include pain or fissure secondary to inappropriate placement of the tip too close to the dentate line

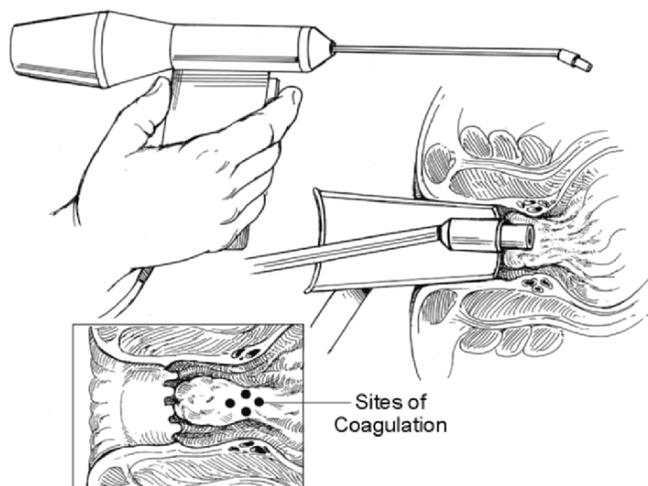


FIGURE 11-5. Infrared photocoagulation. The infrared photocoagulator creates a small thermal injury. Thus, several applications are required for each hemorrhoidal column. [Reprinted from Beck D. Hemorrhoids. Handbook of Colorectal Surgery. 2nd ed. Copyright 2003 by Taylor & Francis Group LLC (B). Reproduced with permission of Taylor & Francis Group LLC (B) in the format Textbook via Copyright Clearance Center.]

or bleeding caused by excessive application of the probe tip. The infrared coagulator works best with small, bleeding, first- and second-degree hemorrhoids. It has been described to be slightly less painful than rubber banding.⁶⁷ In three randomized trials, hemorrhoid bleeding was successfully controlled in the majority of patients with first- and second-degree hemorrhoids.^{53,66,67}

Bipolar diathermy or coagulation (BICAP; Circon ACMI, Stamford, CT) is essentially electrocautery in which the heat does not penetrate as deeply as in monopolar coagulation.^{68,69} The diathermy is applied in 1-second pulses at approximately 20 watts until the underlying tissue coagulates. The depth of injury is 2.2 mm and, unlike infrared photocoagulation, the depth does not increase with multiple applications at the same site which frequently is necessary.^{66,69} First-, second-, and third-degree hemorrhoids have been treated with success rates varying from 88% to 100% whereas up to 20% of patients may need excisional hemorrhoidectomy for prolapsing tissue.^{21,51,66,68-70}

Direct-current electrotherapy is applied through a probe placed via an anoscope onto the mucosa at the apex of the hemorrhoid. Application of the 110-volt direct current is set to the maximal tolerable level (approximately 16 mA) and then left in place for approximately 10 minutes.^{51,69-73} Multiple treatments are required to the same site in up to 30% of patients with second- and third-degree hemorrhoids.⁷¹ Adequate control of bleeding in up to 88% of patients is obtained when adequate current levels and contact time are used.^{51,69} This technique, however, has not been widely accepted primarily because of the lengthy treatment times and limited effect in higher-degree hemorrhoids.⁷³ Reported complications include pain, ulcer formation, and bleeding.

Sclerotherapy

This office method relies on the injection of chemical agents into hemorrhoids that create fibrosis, scarring, shrinkage, and fixation of the hemorrhoid by obliterating the vascularity with a sclerosant solution. This procedure takes minutes to perform in the office and does not require anesthesia. Frequently used agents include 5% phenol in oil, 5% quinine and urea, or hypertonic salt solution. Approximately 2-3 mL of the sclerosant is injected into the submucosa of each hemorrhoid bundle at least 1 cm proximal to the dentate line with a 25-gauge spinal needle or specialized hemorrhoid needle (Gabriel). Care should be taken to avoid intramucosal or intramuscular injection in order to prevent mucosal sloughing with ulceration or excessive pain, respectively. Sclerotherapy should not be performed in the face of anorectal infection or with prolapsed thrombosed hemorrhoids. Sclerotherapy can be used in patients on long- or short-term anticoagulation. Repetitive sclerotherapy should be used with caution because of the potential of scarring and stricture formation. Complications are infrequent and usually related to incorrect placement of the sclerosant.^{53,74} Rarely, a patient may develop

impotence, urinary symptoms, or an abscess secondary to a misplaced injection or granulomatous reaction to the oil-based sclerosant.⁷⁵ Sclerotherapy works best for first- and second-degree hemorrhoids. Walker et al.⁵³ reported a 30% recurrence rate of symptoms 4 years after initial successful injection. Khoury et al.⁷⁶ performed a prospective, randomized study in 120 consecutive patients looking at single versus multiple phenol injections for the treatment of hemorrhoids in patients who have had prior medical therapy. Results from that study showed that injection sclerotherapy, whether single or multiple, is an effective form of therapy for patients with first- or second-degree hemorrhoids with improvement or cure in almost 90% of patients.⁷⁶ Another randomized, prospective study, however, showed no difference in bleeding rates at 6 months follow-up when comparing sclerotherapy plus bulk laxative to bulk laxative alone.⁷⁷

Anal Dilatation or Stretch

This method of treating hemorrhoids by manual dilatation of the anus was reported and popularized by Lord in 1968.⁷⁸ Although it has had its proponents, primarily in European countries, subsequent reports have shown endosonographic evidence of sphincter injury as well as high rates of associated incontinence especially with long-term follow-up.⁷⁹⁻⁸¹ In addition to its higher failure rate in comparison to surgical hemorrhoidectomy, and because of the risk of incontinence, most authorities advocate abandoning this approach for the treatment of hemorrhoids.^{81,82}

Cryotherapy

Cryotherapy is based on the concept that freezing the internal hemorrhoid at low temperatures can lead to tissue destruction. A special probe is required through which nitrous oxide at -60° to -80°C or liquid nitrogen at -196°C is circulated. Initial enthusiasm with cryotherapy essentially has disappeared because of very disappointing results. The procedure is time consuming and associated with a foul-smelling profuse discharge, irritation, and pain.⁸³⁻⁸⁵ Furthermore, improper application can lead to anal stenosis and or incontinence from sphincter destruction. The procedure should no longer be recommended for the treatment of internal hemorrhoids.

External Hemorrhoids

Acute Thrombosis

Patients with a thrombosed external hemorrhoid typically present with complaints of a painful mass in the perianal region. The pain is frequently described as burning in nature. The pain associated with the abrupt onset of an anal mass usually peaks at around 48 hours and subsides significantly after the fourth day (see Figure 11-6). The skin overlying the thrombosed hemorrhoid may necrose and ulcerate, resulting in bleeding, discharge, or infection.

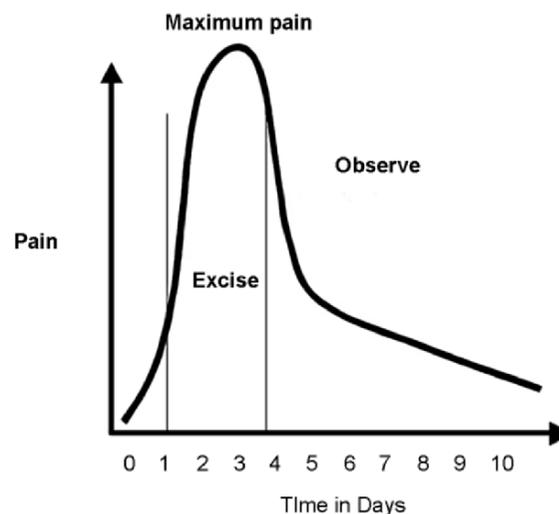


FIGURE 11-6. Timing of excision of a thrombosed external hemorrhoid.

Treatment should be aimed at relief of pain. The management will depend, therefore, on the patient's symptoms at the time seen. If the pain is intense, then excision of the thrombosed external hemorrhoid should be offered. If the pain is subsiding, then conservative nonoperative management is warranted. Nonoperative treatment consists of warm sitz baths, nonconstipating analgesics, and bulk-producing fiber supplements. Anoscopy and proctoscopy to rule out associated anorectal disease are postponed to a later date when the patient is not in acute pain.

The operative treatment of a thrombosed external hemorrhoid demands excision of the entire thrombus. This can be done in the clinic, office, or emergency room under local anesthesia (0.5% lidocaine mixed with equal amounts of 0.25% bupivacaine containing 1:200,000 epinephrine). The overlying skin and surrounding area are prepped with Betadine swabs or alcohol and then anesthetized. A small radial elliptical incision is performed directly over the thrombosed hemorrhoid and the thrombus is excised in total with the aid of a fine scissors and forceps. Hemostasis is obtained with either Monsel's solution (ferric subsulfate) on cotton-tipped applicator or with silver nitrate. Although the skin edges can be reapproximated loosely with absorbable sutures, leaving the wounds open to heal by secondary intention gives greater assurance that rethrombosis will not occur in the same location. Postoperatively the patients are given a prescription for analgesics, instructed to take warm sitz baths two to three times daily, and to take bulk-producing fiber supplements.

Operative Hemorrhoidectomy

Hemorrhoidectomy is indicated for patients with symptomatic combined internal and external hemorrhoids who have failed or are not candidates for nonoperative treatments. This would include patients with extensive disease, patients with

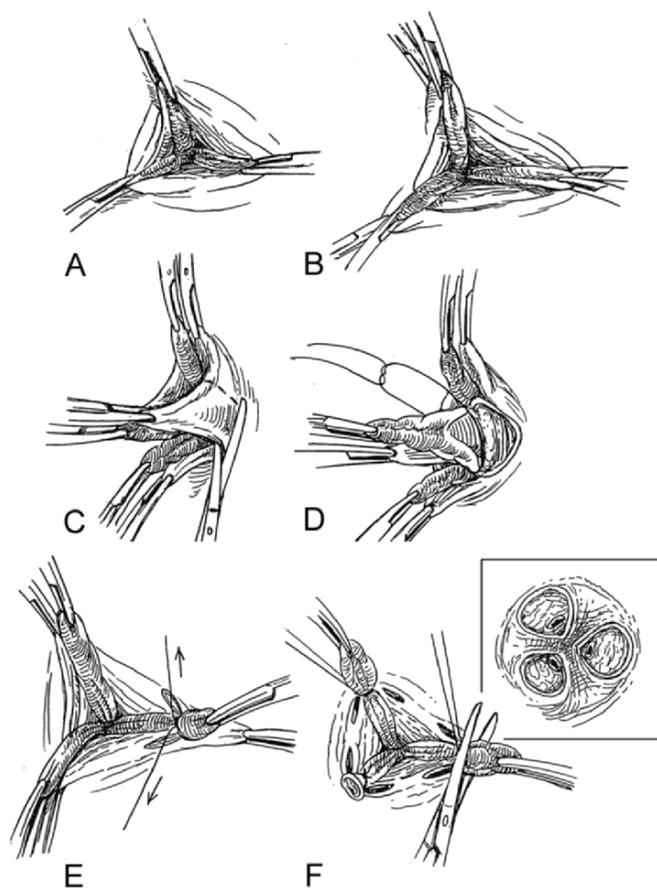


FIGURE 11-7. Open (Milligan-Morgan) hemorrhoidectomy. **A** External hemorrhoids grasped with forceps and retracted outward. **B** Internal hemorrhoids grasped with forceps and retracted outward with external hemorrhoids. **C** External skin and hemorrhoid excised with scissors. **D** Suture placed through proximal internal hemorrhoid and vascular bundle. **E** Ligature tied. **F** Tissue distal to ligature is excised. Insert depicts completed three bundle hemorrhoidectomy.

concomitant conditions such as fissure or fistula, and patients with a preference for operative therapy. Only about 5%–10% of patients need surgical hemorrhoidectomy.^{15,86} Recurrence with operative hemorrhoidectomy is uncommon and hemorrhoidectomy is the most effective treatment for hemorrhoids, especially those that are third degree.^{87,88} Hemorrhoidectomy can be performed using a variety of techniques or instruments; however, most are variants of either a closed or open technique.^{89,90} The Milligan-Morgan technique (open) is widely used in the United Kingdom (Figure 11-7). It involves excision of the external and internal hemorrhoid components leaving the skin defects open to heal by secondary intention over a 4- to 8-week period.⁹⁰ The Ferguson hemorrhoidectomy (closed) involves excision of the external and internal hemorrhoid components with closure of the skin defects primarily (Figure 11-8).⁸⁹

Circular excision of the internal hemorrhoids and prolapsing rectal mucosa proximal to the dentate line has also been

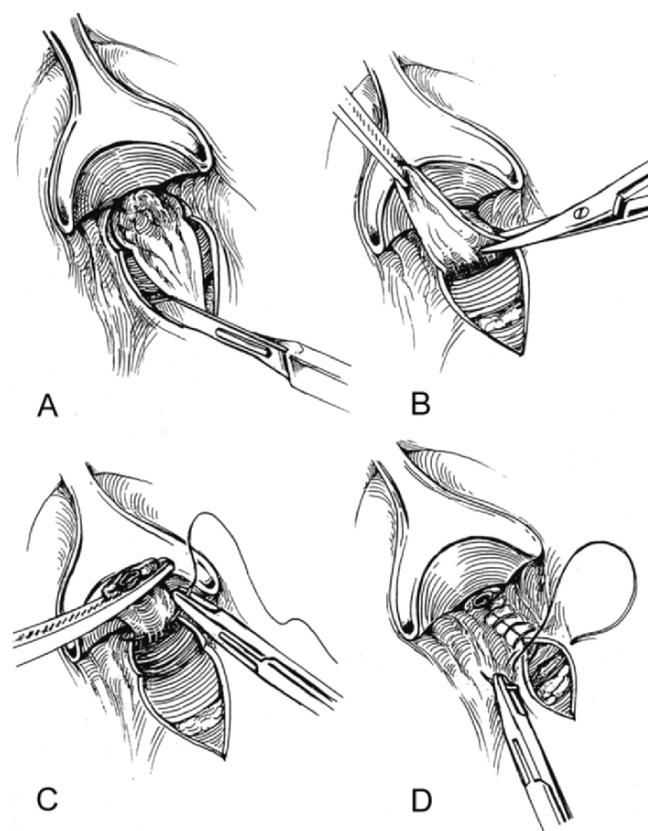


FIGURE 11-8. Modified Ferguson excisional hemorrhoidectomy. **A** Double elliptical incision made in mucosa and anoderm around hemorrhoidal bundle with a scalpel. **B** The hemorrhoid dissection is carefully continued cephalad by dissecting the sphincter away from the hemorrhoid. **C** After dissection of the hemorrhoid to its pedicle, it is either clamped, secured, or excised. The pedicle is suture ligated. **D** The wound is closed with a running stitch. Excessive traction on the suture is avoided to prevent forming dog ears or displacing the anoderm caudally.

described for the surgical management of hemorrhoids (Whitehead procedure, Figure 11-9).^{91–94} This technique involves circumferential excision of hemorrhoidal veins and mucosa beginning at the dentate line and proceeding proximally. It was used often in Great Britain but has fallen out of favor. It is rarely used in the United States because of technical difficulties and the potential for ectropion but has attracted the attention of some surgeons using a modification of the original technique.^{93,95}

Table 11-6 lists four randomized prospective studies comparing open versus closed hemorrhoidectomy.^{96–99} The majority of trials showed no difference in pain, analgesic use, hospital stay, and complications, whereas complete wound healing shows mixed results. There essentially seems to be no difference in both techniques and, therefore, recommendations for either should be based on surgeon experience and patient preference.

One of the most significant obstacles to patients seeking surgical management of their hemorrhoids is postoperative pain. Narcotics are often required to control pain and patients are frequently not back to their usual activities including work for 2–4 weeks.^{100–103} A number of trials have looked at results with a variety of different excision techniques including scissors, diathermy, laser, bipolar diathermy (LigaSure™; Valleylab, Boulder, CO), and the ultrasonically activated scalpel.^{104–117} Although some of these newer instruments have come into vogue for performing operative hemorrhoidectomy such as the Harmonic Scalpel® or LigaSure™ device, no long-term results have been published utilizing these modalities^{104,105,113} (see Tables 11-7 and 11-8). Furthermore, the additional costs accrued through the use of this equipment and the lack of documented superior results with these techniques precludes recommendation for routine use. The majority of randomized trials have shown no difference between diathermy or scissor excision hemorrhoidectomy^{106,116,117} (see Table 11-7). Laser hemorrhoidectomy was initially suggested to be associated with decreased postoperative pain; however, a randomized trial comparing Nd:YAG laser versus cold scalpel did not detect any difference.^{107–109} Furthermore, the trial reported increased costs and decreased wound healing with use of the laser.¹⁰⁹

Other strategies or procedures developed in an attempt to reduce postoperative pain include use of limited incisions, suturing the vascular pedicle without any incisions, performing a concomitant lateral internal sphincterotomy, use of metronidazole, using anal sphincter relaxants, injecting local anesthetics, using anxiolytics, and parasympathomimetics. All these strategies, however, have had mixed results and therefore cannot be recommended for routine use.^{118–127}

Complications associated with hemorrhoidectomy include urinary retention (2%–36%), bleeding (0.03%–6%), anal stenosis (0%–6%), infection (0.5%–5.5%), and incontinence (2%–12%).^{86,107,109,128–134}

Another method recently developed to reduce pain and treat hemorrhoidal disease has recently come into favor. Over the past 6–7 years, stapled “hemorrhoidectomy” has been developed as an alternative to standard Ferguson or Milligan-Morgan hemorrhoidectomy mainly because of the pain associated with traditional hemorrhoid surgery. It was first alluded to by Pescatori et al.¹³⁵ for mucosal prolapse but refined by Longo¹³⁶ using a specially developed circular stapling device (see Figure 11-10). The procedure involves the use of a specially designed circular stapler (Ethicon Endo-Surgery), which performs a circumferential resection of mucosa and submucosa above the hemorrhoids and then staples closed the

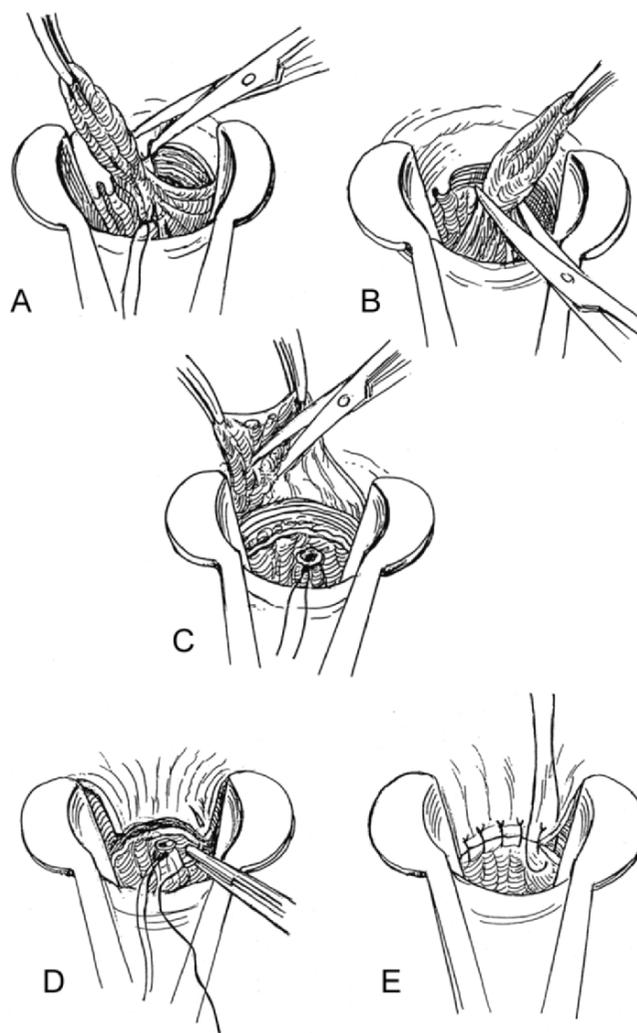


FIGURE 11-9. Whitehead hemorrhoidectomy. **A** Suture placed through proximal internal hemorrhoid for orientation. Excision started at dentate line and continued to proximal bundle. **B** Internal hemorrhoidal tissue excised above ligated bundle. **C** Vascular tissue excised from underside of elevated anoderm. **D** End of anoderm reapproximated with sutures to original location of dentate line. **E** Completed procedure.

defect (see Figure 11-11). This procedure is more of a hemorrhoidopexy than a hemorrhoidectomy and is also known by other names (stapled anopexy, stapled prolapsectomy, stapled circumferential mucosectomy). None of the hemorrhoids are necessarily removed by this procedure, rather they are simply returned to their physiologic position. The preservation of the

TABLE 11-6. Randomized, prospective studies of open versus closed hemorrhoidectomy

Author	N	Pain	Complete wound healing	Analgesics	Hospital stay	Complications
Ho	67	n.s.	O > C	n.s.	n.s.	n.s.
Carapeti	36	n.s.	n.s.	n.s.	n.s.	n.s.
Arbman	77	n.s.	C > O	n.s.	n.s.	n.s.
Gencosmanoglu	80	C > O	C > O	C > O	n.s.	C > O

C, close; O, open; n.s., not significant.

TABLE 11-7. Randomized, prospective studies of LigaSure™ versus diathermy hemorrhoidectomy

Author	N	Operative time	Blood loss	Hospital Stay	Postoperative pain	Complications
Jayne	40	L < D	L < D	L < D	n.s.	n.s.
Palazzo	34	L < D	?	n.s.	n.s.	n.s.
Franklin	34	L < D	?	n.s.	L < D	?

L, LigaSure™; D, diathermy; n.s., not significant; ?, not reported; N, number.

TABLE 11-8. Randomized, prospective studies of ultrasonic scalpel (Harmonic) versus diathermy hemorrhoidectomy

Author	N	OR time	Postoperative pain	QOL	Complications
Khan	30	n.s.	Day 1 = n.s. Day 7 HS > D	n.s.	n.s.
Tan	50	n.s.	n.s.	?	n.s.
Armstrong	50	?	H < D	?	n.s.
Chung*	86	NS	H < BS H < S	n.s.	n.s.

H, Harmonic Scalpel; D, diathermy; n.s., not significant; BS, bipolar scissors; S, scissors; QOL, quality of life.

*This study compared results between the ultrasonic scalpel and either bipolar scissors or regular scissors.

anal cushions within the anal canal may in fact contribute to the low rate of incontinence after this operation. This procedure can be used for patients with all degrees of hemorrhoids, however is best reserved for patients with second- and third-degree hemorrhoids that do not respond to banding and fourth-degree hemorrhoids that are reducible under anesthesia.¹³⁷ The cost and anesthetic risks do not make stapling a practical option for grade 1 and 2 disease, which should continue to be treated with traditional methods. The stapling

device cuts and staples well above the dentate line, therefore postoperative pain is minimal, and usually absent. The stapling procedure does not create any external wounds.

A number of randomized, controlled trials comparing stapled hemorrhoidopexy with conventional hemorrhoidectomy have been published as well as reviewed and are listed in Table 11-9.^{100-103,138-149} Cochrane review on a registered Cochrane title comparing stapled anopexy with excisional methods is pending. The majority of studies show that stapled

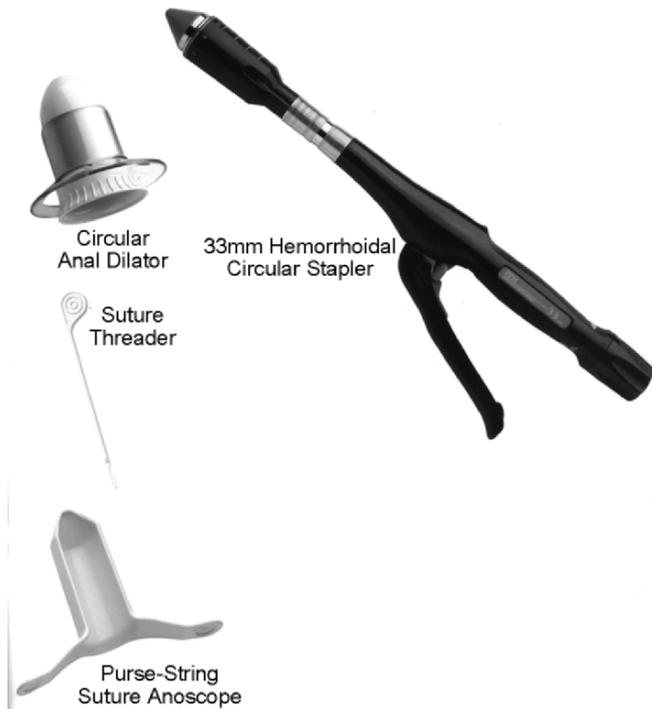


FIGURE 11-10. Second generation PPH-03 hemorrhoid stapler. Shown are 33-mm hemorrhoidal circular stapler, suture threader, circular anal dilator, and pursestring suture anoscope. (Reprinted with permission from Ethicon Endo-Surgery.)

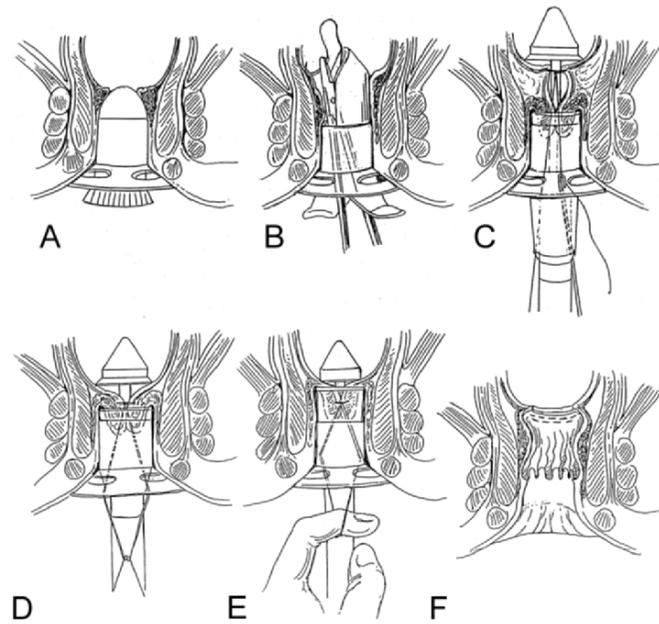


FIGURE 11-11. Stapled anoplasty (procedure for prolapse and hemorrhoids). **A** Retracting anoscope and dilator inserted. **B** Mono-filament pursestring suture (eight bites) placed using operating anoscope approximately 3–4 cm above anal verge. **C** Stapler inserted through pursestring. Pursestring suture tied and ends of suture manipulated through stapler. **D** Retracting on suture pulls anorectal mucosa into stapler. **E** Stapler closed and fired. **F** Completed procedure.

TABLE 11-9. Prospective, randomized trials comparing stapled hemorrhoidopexy with excisional hemorrhoidectomy

Author	Year	Location	No. PPH patients	No. excisional patients	Follow-up	Conclusions regarding stapled hemorrhoidopexy
Ho ¹³⁸	2000	Singapore	57	62 MM	3 mo	Similar LOS, less pain at bowel movement, less analgesics, earlier return to work, similar complications, similar manometry and U/S data
Mehigan ¹⁰³	2000	United Kingdom	20	20 MM	4 mo	Less pain, same LOS, similar complications, earlier return to activity
Rowsell ¹³⁹	2000	United Kingdom	11	11 MM	6 wk	Shorter LOS, less pain, earlier return to activity
Boccasanta ¹⁰⁰	2001	Italy	40	40 MM	20 mo	Less OR time, less pain, similar complications, earlier return to work, same recurrence
Brown ¹⁴⁰	2001	Singapore	15	15 MM	6 wk	For thrombosed internal hemorrhoids: less pain, more complications, earlier return to work
Shalaby ¹⁰²	2001	Egypt	100	100 MM	1 y	Less OR time and LOS, less pain, earlier return to work, less anal discharge, fewer complications
Correa-Rovelo ¹⁴¹	2002	Mexico	42	42 Ferg	6 mo	Less OR time, less pain, fewer complications, shorter time to BM, earlier return to activity
Hetzer ¹⁰¹	2002	Switzerland	20	20 Ferg	1 y	Less OR time, less pain, similar complications, earlier return to work, same recurrence
Ortiz ¹⁴²	2002	Spain	27	28 MM	1 y	Less OR time, less pain, similar return to work, similar complications, more recurrent prolapse
Pavlidis ¹⁴³	2002	Greece	40	40 MM	1 y	Less OR time, shorter LOS, less pain, less analgesics, greater satisfaction, similar symptom control
Wilson ¹⁴⁴	2002	United Kingdom	32	30 MM	8 wk	Less OR time, shorter LOS, shorter postoperative time with anal pad, more postoperative bleeding, reduced anal discharge, shorter time to work
Cheetham ¹⁴⁵	2003	United Kingdom	15	16 MM	18 mo	Less pain, earlier time to work, two PPH patients with persistent pain/fecal urgency, same satisfaction, similar symptom control
Kairaluoma ¹⁴⁶	2003	Finland	30	30 MM	1 y	Less pain, earlier return to work, similar complications, more treatment failures
Maw ¹⁴⁷	2003	Singapore	101	98 MM	Perioperative	No difference in rate of bacteremia
Palimento ¹⁴⁸	2003	Italy	37	37 MM	6 mo	Less OR time, less pain, less pain with BM, similar return to activity, similar symptom control
Senagore ¹⁴⁹	2003	United States	77	79 Ferg	1 y	Less pain, less pain at BM, less analgesics, fewer re-treatments, similar symptom control

Los = length of stay
 uls = ultrasound
 MM = Milligam-Morgan
 OR = operating room
 BM = bowel movement
 Ferg = Ferguson
 PPH = procedure for prolapse and hemorrhoids
 wk = week
 mo = month y = years

hemorrhoidopexy is less painful, and allows earlier return to work compared with conventional hemorrhoidectomy. A systematic review of stapled hemorrhoidopexy concluded that the procedure was as safe as conventional hemorrhoidectomy and was associated with shorter operative time, convalescence, and postoperative disability.¹⁵⁰ Senagore et al.¹⁴⁹ reported results from a U.S. multicenter, randomized, prospective study on stapled anopexy versus Ferguson hemorrhoidectomy at the American Society of Colon and Rectal Surgeons annual meeting in 2003. The results showed less pain, less pain at bowel movement, less analgesic use, and fewer re-treatments, with similar symptom control in comparison to Ferguson hemorrhoidectomy. Despite these early encouraging results and safety profile, several serious complications have been reported including rectal perforation,

retroperitoneal sepsis, and pelvic sepsis.^{151,152} Other studies have indicated the presence of smooth muscle fibers in the excised specimens as well as a 14% incidence of internal sphincter fragmentation in those procedures in which the standard 37-mm anal dilator is used.^{153,154} What long-term sequelae this may have remains to be seen.

The main complication of the procedure is bleeding from the staple line, which can be easily controlled by oversewing the bleeding point on the staple line.¹⁵⁵ With the second generation 33-mm hemorrhoidal circular stapler (Ethicon Endo-Surgery; PPH03) and a closed staple height of 0.75 mm, bleeding has been markedly decreased. One other disadvantage of the stapling procedure is that it does not address fibrotic external hemorrhoids or additional anorectal pathology such as fissures or skin tags.

Stapling Technique

The stapling procedure can be done with the patient in the prone jackknife, lithotomy, or left lateral position while under local, spinal, or general anesthesia. A circular anal dilator is introduced into the anal canal, which reduces the prolapsed tissues. The obturator is removed, and the prolapsed tissue falls into the lumen of the dilator. A circumferential pursestring suture is placed 4–6 cm above the dentate line into the submucosa. The circular stapler is opened and the head is introduced proximal to the pursestring. The pursestring suture is tied and the suture threader is used to pull the free ends of the pursestring suture through a pair of holes on the lateral sides of the stapler. Traction is applied to the pursestring while the stapler is being closed, which causes the prolapsed mucosa and some hemorrhoidal tissue to be drawn into the casing. The stapler is fully tightened and then fired. The instrument should be left closed for 20 seconds after firing to enhance hemostasis. The staple line should be carefully examined for hemostasis and any bleeding areas should be oversewn. Anoscopic examination will reveal persistent internal hemorrhoids. It is important to remember that this technique does not completely excise the hemorrhoids; rather, it returns the tissues to their physiologic location. The circular specimen will contain the excised tissue and the pursestring suture.

Strangulated Hemorrhoids

Strangulated hemorrhoids arise from prolapsed third- or fourth-degree hemorrhoids that become incarcerated and irreducible because of prolonged swelling. Patients usually have a long-standing history of prolapse and may present with complaints of severe pain and urinary retention. Examination shows a rosette of thrombosed external hemorrhoids and prolapsed incarcerated internal hemorrhoids with marked edema. This can progress to subsequent ulceration and necrosis if left untreated.

Treatment usually consists of urgent or emergent hemorrhoidectomy in an operating room. An open or closed technique can be performed unless tissues are necrotic in which case the open technique should be performed. Emergency hemorrhoidectomy in the presence of strangulation and necrosis is safe provided all necrosis is excised.¹³⁴

An alternative treatment that can be performed in the office or emergency department setting consists of locally anesthetizing the area, collapsing the tissues via massage, reducing the internal hemorrhoids and performing multiple external thrombectomies, and multiple rubber band ligations. This can provide immediate relief and future hemorrhoidectomy is seldom needed.¹⁵⁶ A randomized trial comparing open hemorrhoidectomy versus incision and ligation for acute hemorrhoidal disease showed both techniques to be safe and with a trend toward earlier recovery from the incision ligation technique.¹⁵⁶

Hemorrhoids, Varices, and Portal Hypertension

The etiology of “hemorrhoids” in patients with portal hypertension must be distinguished from anorectal varices especially when bleeding is present. The upper anal canal (internal hemorrhoids) is drained by the middle rectal vein which drains into the iliac veins and subsequently into the systemic circulation. The inferior rectal veins drain the lower part of the anal canal (external hemorrhoids) into the internal iliac veins. Anorectal varices essentially provide a collateral pathway to decompress the portal system into the systemic circulation. Despite this communication between the portal and systemic systems, the incidence of hemorrhoidal disease in patients with portal hypertension is no greater than in the general population.^{157–159}

Chawla and Dilawari¹⁶⁰ observed anorectal varices endoscopically in approximately 78% of their patients. Hosking et al.¹⁵⁷ observed varices in 59% of cirrhotic patients with portal hypertension. Hence, anorectal varices are actually quite common in patients with portal hypertension. However, unlike esophageal varices, anorectal varices rarely bleed and are implicated in less than 1% of massive bleeding episodes in patients with portal hypertension.¹⁶¹ Nevertheless, bleeding from anorectal varices has been reported and may be continuous or intermittent and massive. Treatment of bleeding from anorectal varices has included a conservative medical management, direct suture ligation,¹⁶² stapled anopexy,¹⁶³ transjugular intrahepatic portosystemic shunt,^{164–166} ligation of the inferior mesenteric vein,¹⁶⁷ inferior mesocaval shunt,¹⁶⁸ inferior mesorectal vein shunt,¹⁶⁹ sigmoid venous to ovarian vein shunt.¹⁷⁰

Hemorrhoids in Pregnancy

Although hemorrhoidal symptoms often occur and are exacerbated during pregnancy, the majority that intensify during delivery usually resolve. Hemorrhoidectomy during pregnancy should only be offered for acutely thrombosed and prolapsed hemorrhoidal disease. If required, the procedure should be performed under local anesthesia with the patient in the left anterolateral position to rotate the uterus off the inferior vena cava.^{9,171}

Hemorrhoids and Crohn’s Disease

Crohn’s disease of the intestine in and of itself is not an absolute contraindication to hemorrhoidectomy. However, extreme caution and careful patient selection are warranted. In a study published from St. Mark’s hospital, the rate of severe complications was high.¹⁷² Approximately 30% of their Crohn’s patients treated for hemorrhoids required a proctectomy for complications possibly related to the treatment. In contrast, Wolkomir and Luchtefeld¹⁷³ reported a 2-month healing rate of almost 90% in Crohn’s patients with

quiescent ileal or colonic disease undergoing hemorrhoidectomy. Nevertheless, hemorrhoidectomy in patients with anorectal Crohn's disease or Crohn's proctitis should not be performed because of a substantially increased risk of local complications and subsequent need for proctectomy.¹⁷²

Hemorrhoids and the Immunocompromised

Management of hemorrhoidal disease in the immunocompromised patient is challenging and fraught with difficulties secondary to poor wound healing and infectious complications. Although it does not appear that surgery increases the mortality in patients with hematologic malignancies (leukemia, lymphoma), hemorrhoidectomy should be performed as a last resort to relieve pain and sepsis.¹⁷⁴ Stapled hemorrhoidopexy may offer an alternative to excisional hemorrhoidectomy, avoiding external wounds and hence problems with wound healing; however, data in this group of patients are anecdotal at best. Although infection with the human immunodeficiency virus is not a contraindication to hemorrhoidectomy, it cannot be recommended for patients with the acquired immunodeficiency syndrome because of increased complications.¹⁷⁵

Posthemorrhoidectomy Hemorrhage

Severe hemorrhage after hemorrhoidectomy is a rare complication occurring in approximately 2% (0.6%–5.4%) of patients.^{176,177} Traditionally, sepsis of the ligated pedicle has been considered an important etiological factor, although this has been challenged by a recent study by Chen et al.¹⁷⁸ who found male patients and operating surgeon as risk factors. The majority of patients will respond to packing or tamponade with a Foley catheter balloon. Approximately 15%–20% of patients may need suture ligation to control the postoperative bleed. Initial rectal irrigation has been suggested as a technique to separate patients that have stopped bleeding from those that need to go to the operating room.¹⁷⁹ Another helpful technique is to irrigate the rectum free of clots and blood at the initial hemorrhoid operation, to prevent postoperative passage of old clots that could cause clinical confusion.

Appendix: Practice Parameters for Ambulatory Anorectal Surgery

Prepared by The Standards Task Force, The American Society of Colon and Rectal Surgeons

Drs. Ronald Place and Neal Hyman, Project Coordinators; Clifford Simmang, Committee Chairman; Peter Cataldo; James Church; Jeff Cohen; Frederick Denstman; John Kilkenny; Juan Noguerras; Charles Orsay; Daniel Otchy; Jan Rakinic; Joe Tjandra

Ambulatory Facilities

Anorectal Surgery May Be Safely and Cost-Effectively Performed in an Ambulatory Surgery Center.

Level of Evidence—Class III (Appendix A). It has been estimated that 90% of anorectal cases may be suitable for ambulatory surgery. A wide variety of anorectal conditions including condylomata, fissures, abscesses, fistulas, tumors, hemorrhoids, pilonidal disease, and various miscellaneous conditions have been shown to be amenable to surgery on an outpatient basis. An admission rate of 2% has been reported. A reduction in hospital charges of 25%–50% has also been noted.

Patients with American Society of Anesthesiology (ASA) Classifications I and II Are Generally Considered Suitable Candidates for Outpatient Anorectal Surgery (Appendix B). Selected ASA Category III Patients May Also Be Appropriate Candidates.

Level of Evidence—Class III. Multiple factors must be considered in determining the appropriateness of performing anorectal surgery in the ambulatory setting. The ASA physical status classification is useful to determine the risk of anesthesia. The magnitude of the proposed surgery, type of anesthesia, availability of appropriate instrumentation, ability of the patient to follow instructions, distance of the patient's home from the surgical center, and home support structure all need to be considered.

Preoperative Evaluation

Preoperative Investigations (e.g., Laboratory Studies and Electrocardiograms) Should Be Dictated by History and Physical Examination.

Level of Evidence—Class III. Multiple studies have documented that patient history and physical examination are the key elements of an appropriate preoperative evaluation. Routine preoperative investigations that are not warranted on the basis of history and physical seem to provide little further information. There is clear evidence that nonselective preoperative screening yields few abnormal results.

One study of 1200 patients undergoing ambulatory surgery revealed that the vast majority of abnormalities could have been predicted by history and physical examination. These abnormalities did not predict perioperative complications or the need for hospital admission. A separate study of 1109 patients undergoing elective surgery revealed that 47% of laboratory investigations duplicated tests performed within the previous year. Meaningful changes in the repeat laboratory values were very rare. Such abnormalities were predictable by the patient's history. A further study of 5003 preoperative screening tests revealed 225 abnormal results. Only 104 were of potential importance and the abnormality caused action in only 17 cases. It was believed that only four patients could have had a conceivable benefit from their preoperative screening test.

Similar studies have been performed to investigate the value of specific tests. A study of 12,338 patients undergoing invasive procedures was performed to examine the value of determining activated partial thromboplastin time as a routine. Ninety-two percent of the patients were believed to be at low risk (there were no clinical factors to suggest the bleeding tendency). In these patients, it was shown that no information was gained from activated partial thromboplastin time, and therefore, clotting studies had no role as a screening test in asymptomatic patients. Similarly, routine cardiac workup seems unjustified. The risk of a perioperative myocardial infarction in patients without clinical evidence of heart disease is 0.15%. This risk increases significantly in patients who had a previous myocardial infarction. History and physical examination are the cornerstones of appropriate preoperative evaluation.

Intraoperative Considerations

Most Anorectal Surgery May Be Safely and Cost-Effectively Performed Under Local Anesthesia; Regional or General Anesthesia May Be Used Depending on Patient or Physician Preference.

Level of Evidence—III. The use of local anesthetics such as monitored anesthetic care for anorectal surgery is safer and has fewer complications than other anesthetic techniques. Perianal infiltration of local anesthetics is a simple procedure that is easily learned. Injection of the local anesthetics can be accomplished in less than 5 minutes and the operation begun immediately. However, the anesthetic technique used for any procedure should be the one that provides for maximal safety and efficacy.

Postoperative Considerations

Anorectal Surgery Patients May Safely Be Discharged from the Postanesthesia Care Unit.

Level of Evidence—II. The time course for recovery from anesthesia includes early recovery, intermediate recovery, and late recovery. Early recovery is the time interval for anesthesia emergence and recovery of protective reflexes and motor activity. The Aldrete score has been used for 30 years to determine release from phase 1 (early) recovery to a hospital bed or phase 2 (intermediate) recovery. Intermediate recovery is the period during which coordination and physiology normalize to an extent that the patient can be discharged from phase 2 recovery in a state of “home readiness” and be able to return home in the care of a responsible adult. The Post-Anesthetic Discharge Scoring System has been shown to be efficacious for discharge.

Multiple Modalities May Be Used to Achieve Adequate Postoperative Pain Control.

Level of Evidence—II. If local anesthetics are not used as the primary anesthetic technique, their use will provide

TABLE 11-A1. Levels of evidence

Level I: Evidence from properly conducted randomized, controlled trials.
Level II: Evidence from controlled trials without randomization, or cohort or case-control studies, or multiple times series, dramatic uncontrolled experiments.
Level III: Descriptive case series or opinions of expert panels.

TABLE 11-A2. ASA physical status classification

Class I: Patient has no systemic disturbance (e.g., healthy, no medical problems).
Class II: Patient has mild to moderate systemic disturbance (e.g., hypertension, diabetes).
Class III: Patient has severe systemic disturbance (e.g., heart disease that limits activity).
Class IV: Patient has severe systemic disturbance that is life-threatening (e.g., unstable angina, active congestive heart failure).
Class V: Patient is moribund and has little chance of survival (e.g., ruptured abdominal aortic aneurysm).

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prolonged postoperative analgesia. Oral narcotics may be used as primary postoperative analgesia. The use of nonsteroidal antiinflammatory drugs, particularly intramuscular or intravenous Toradol® (Roche Pharmaceuticals, Nutley, NJ) or sulindac suppositories has also shown improved analgesia, lower narcotic usage, and lower rates of urinary retention. Although the effect is unknown, oral metronidazole shows improved postoperative pain control.

Postoperative Urinary Retention Can Be Reduced by Limiting Perioperative Fluid Intake.

Level of Evidence—III. Multiple studies have shown that limiting perioperative fluid lowers the incidence of postoperative urinary retention. These same studies show conflicting evidence over the relationship between gender, age, and the quantity of narcotic medication and urinary retention. Hemorrhoidectomy and the performance of multiple anorectal procedures have higher rates of urinary retention.

Postoperative Education Should Include Recommendations for Sitz Baths, Fluid Intake, and Activity Limitations.

Level of Evidence—III. Textbooks of anorectal surgery advocate consistent instructions before discharge from ambulatory surgery. Although derived from common sense, scientific justification does not exist. With appropriate communication, ambulatory anorectal surgery may be performed with a high degree of patient satisfaction.

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