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Hemorrhoids

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Key Concepts

- The classification system of hemorrhoidal disease is based on the degree of clinical prolapse seen on the physical examination.
- Medical therapy for hemorrhoidal symptoms should be the initial treatment recommendation and can include dietary changes, increased water intake, fiber supplementations, and ointment therapy.
- Office-based procedures are offered mainly for internal hemorrhoidal disease with the most common procedure being rubber band ligation.
- Injection sclerotherapy may be performed on an anticoagulated patient due to the fibrotic reaction with almost no increased risk of bleeding.
- Excisional hemorrhoidectomy is the gold standard by which all surgical procedures are compared.
- Postoperative bleeding can occur at one of two different times, right after the procedure itself and delayed hemorrhage occurring 7–10 days post procedure.
- Urgent hemorrhoid surgery is usually reserved for the patient with strangulated, incarcerated, gangrenous hemorrhoids.

Hemorrhoids are one of the most common ailments that will be seen by a colon and rectal surgeon. While hemorrhoids can present in many different ways, there are a number of different conditions that are mistaken by patients and practitioners alike as "hemorrhoids."

Anatomy

Hemorrhoids are a normal part of the anal canal. Our understanding of hemorrhoid anatomy has not changed substantially since 1975 when Thomson published his master's thesis based on anatomic and radiologic studies and first used the term "vascular cushions" [1]. Per Thomson, the submucosa does not form a continuous ring of thickened tissue but instead is a discontinuous series of cushions. Anatomically the three main cushions are located in the left lateral, right anterior, and right posterior positions. Each of these thicker layers has a submucosa filled with blood vessels and muscle fibers. The muscle fibers arise from the internal sphincter and from the conjoined longitudinal muscle. These muscle fibers are thought to be important in maintaining the integrity of the hemorrhoid, and it is the breakdown of this tissue that can contribute to the hemorrhoids becoming symptomatic. The arterial blood supply to hemorrhoids is primarily from the terminal branches of the superior hemorrhoidal artery; branches of the middle hemorrhoidal artery also contribute. Venous outflow is from the superior, middle, and inferior hemorrhoidal veins (Figure 12-1) [2].

Etiology

There are numerous possible reasons why hemorrhoids become symptomatic. Dietary patterns, behavioral factors, anything that can cause excessive straining, and sphincter dysfunction are among the most common reasons. Thompson's vascular cushion theory states that normal hemorrhoidal tissue represents discrete masses of submucosa. During straining, the vascular cushions can become engorged and possibly prevent the escape of fecal material or gas. With the passage of time, however, the anatomic structures supporting the muscular submucosa weaken, allowing the hemorrhoidal tissue to slip or prolapse, leading to typical hemorrhoidal symptoms. Haas et al. noted that supporting tissues can be shown microscopically to deteriorate by the third decade of life [3].

Studies have investigated why this degradation occurs and what are the changes in the local microvasculature. Matrix metalloproteinases (MMPs) are enzymes present in the extracellular space and can degrade collagen, elastin, and

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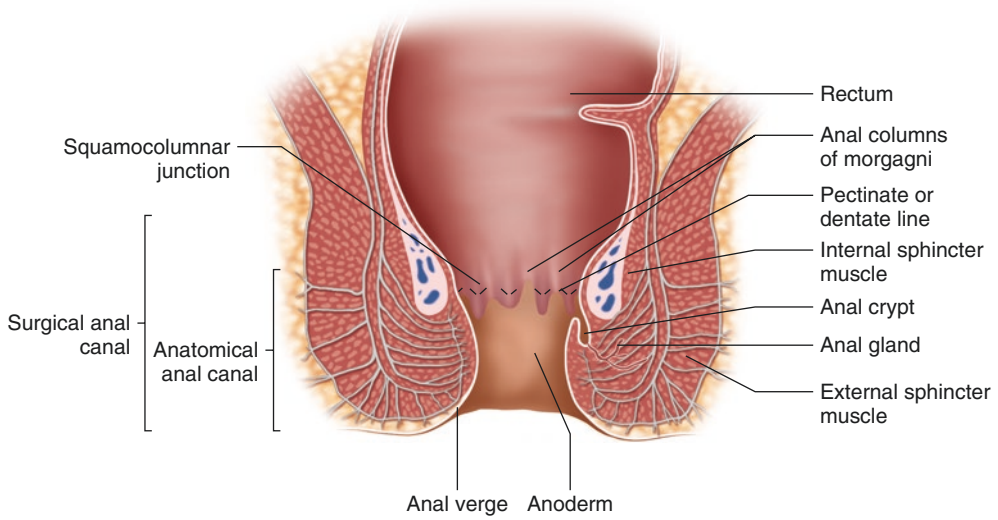

FIGURE 12-1. Hemorrhoid anatomy.

fibronectin. MMP-9 has been found to be overexpressed in hemorrhoid tissue in association with breakdown of elastic fibers [4]. Once the hemorrhoids start to prolapse, the internal sphincter can slow the rate of venous return and increase the hemorrhoid engorgement.

Increased vascular supply and neovascularization may play a role in making hemorrhoids more symptomatic. Aigner found that the terminal branches of the superior hemorrhoidal artery were larger in diameter, had greater flow, and higher peak velocity and acceleration velocity in patients with hemorrhoids compared to normal volunteers [5, 6]. Microvascular density has also been found to be increased in hemorrhoids. Chung et al. found that endoglin (CD105) which is a binding site for TGF-B and is a proliferative marker for neovascularity was found in over half of hemorrhoidal tissue specimens compared to none in normal anorectal mucosa [7]. Other researchers have found higher expression of angiogenesis-related proteins such as vascular endothelial growth factor (VEGF) in hemorrhoidal specimens [4].

Any process that can hinder venous return is thought to increase hemorrhoidal symptoms. Increased sphincter tone by itself can slow venous return [8, 9]; in fact, studies have shown that resting anal canal pressure is higher in patients with symptomatic hemorrhoids compared to normal subjects [10, 11]. Following hemorrhoidectomy, anal canal pressures drop so it is possible that the anal canal pressures are a result of the hemorrhoids rather than a cause [12]. Other possible causes include pregnancy, chronic cough, pelvic floor dysfunction, and simply being erect. Burkitt and Graham–Stewart suggested that Western diets emphasizing low-residue foods lead to increased straining with defecation [13] causing increased venous backflow predisposing to worsening hemorrhoid symptoms.

Despite the many theories that have been proposed, most of these are very speculative, and almost certainly hemorrhoidal symptoms result from a combination of multiple different factors.

Epidemiology

It is difficult to know the true incidence of hemorrhoids. As mentioned earlier, many patients who believe that they have hemorrhoids in fact have some other malady. One study done in 1990 suggested that the prevalence in the United States was 4.4% with the highest rate being in Caucasian patients between 45 and 65 years of age and elevated social economic status [14]. This sort of study has many potential obvious biases. In 2004, the National Institutes of Health noted that the diagnosis of hemorrhoids was associated with 3.2 million ambulatory care visits, 306,000 hospitalizations, and two million prescriptions in the United States [15].

Classification

Hemorrhoids are generally classified as internal, external, or mixed. Internal hemorrhoids are those located above the dentate line, and external hemorrhoids are located below the dentate line. This classification has important implications for treatment as the relative lack of pain fibers in the internal hemorrhoids allows for many more treatment options compared to the external hemorrhoids.

In addition, there is a classification system of the internal hemorrhoids based on the degree of clinical prolapse (Figure 12-2) [16]. This system is useful as it does allow some comparison of treatment methods between studies. Additionally, prolapse is one of the many main driving symptoms for patients to seek treatment. Unfortunately, this system does not address some of the other hemorrhoidal complaints such as pain, bleeding, and thrombosis since most hemorrhoid complaints are a combination of symptoms.

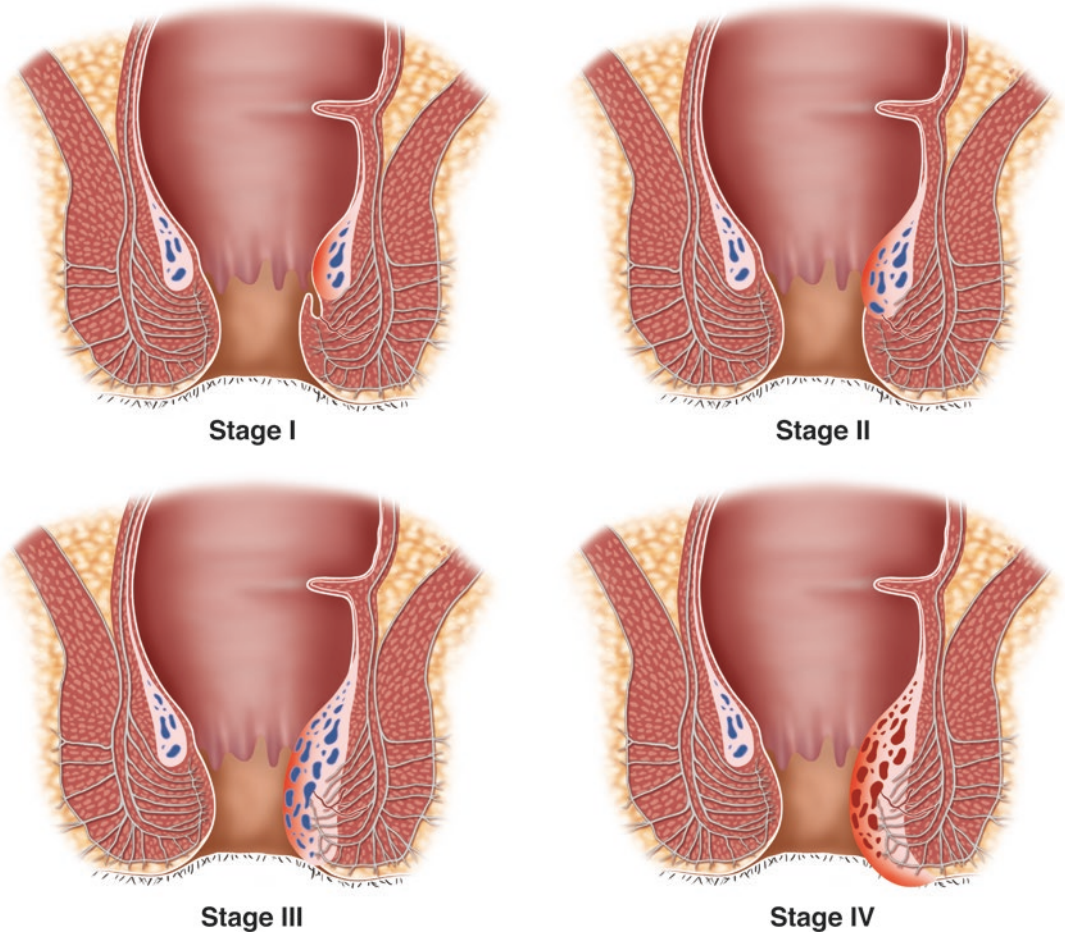

FIGURE 12-2. Hemorrhoid classification table/grading system.

Clinical Presentation

Most patients coming to an outpatient clinic visit with anorectal complaints will feel like they have "hemorrhoids." Bleeding, pain, and protrusion are the most common symptoms associated with hemorrhoids. Each of these components can vary in severity based on whether the internal hemorrhoids, external hemorrhoids, or a combination predominates. Itching can also be described, although itching as an isolated symptom is more often the result of pruritus ani.

When internal hemorrhoids are the primary source of the problem, the main symptoms are a combination of rectal bleeding and prolapse. Pain is very rarely associated with internal hemorrhoids, and in fact when this is a significant component of the presenting complaint, the practitioner should be very suspicious of another source of the problem. The bleeding that occurs with hemorrhoids is typically described as bright red in nature with the frequency ranging from rarely to several times per day. The blood can be seen on the toilet paper and in the toilet water, and sometimes patients even describe the sensation of the blood squirting out of the anus. Typically the frequency and severity will increase over time. Although it is very unusual, there can even be enough bleeding to lead to anemia. Another common symptom of internal hemorrhoids is prolapse. This can range from a simple swelling that quickly reduces after each bowel movement to an internal hemorrhoid that is chronically prolapsed and cannot be reduced. Many of the symptoms of internal and external hemorrhoids overlap. Certainly external hemorrhoids can lead to rectal bleeding in much the same way that internal hemorrhoids can. In addition, the intra-anal portion of the external hemorrhoids can also prolapse out of the anal canal along with the internal hemorrhoid. It can be difficult to distinguish by symptoms alone external hemorrhoids that are engorged and inflamed from prolapsing internal hemorrhoids.

On the other hand, external hemorrhoids are more likely to be associated with pain especially when they are engorged or inflamed. It is the presence of this pain that can help the clinician distinguish whether it is the internal or the external component of the hemorrhoids causing them the most problems.

Thrombosis is one distinct way that hemorrhoids can cause significant symptoms (Figure 12-3). A patient with a thrombosed hemorrhoid will typically describe a sudden onset of pain and swelling in the perianal region. The swelling that occurs will usually last at least days if not weeks,

FIGURE 12-3. Thrombosed external hemorrhoid. Courtesy of Richard Billingham.

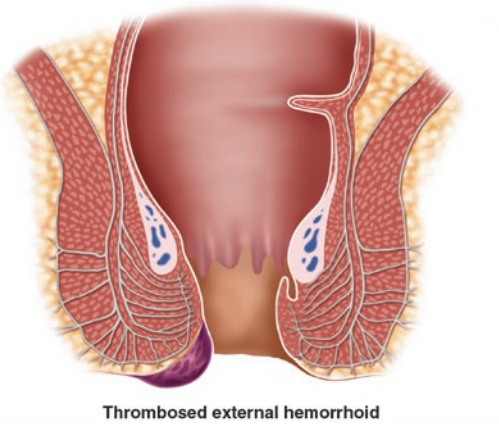

TABLE 12-1. Hemorrhoid symptoms

- Rectal bleeding
- Bright red blood in stool
  - Dripping in toilet
  - On wiping after defecation
- Pain during bowel movements
- Anal itching
- Rectal prolapse (while walking, lifting weights)
- Thrombus
- Extreme pain, bleeding, and occasional signs of systemic illness in case of strangulation

whereas the protrusion that occurs with prolapse or edema usually resolves much quicker. The pain that results from the thrombosed hemorrhoid can vary greatly in severity but is typically constant and unrelenting. Thrombosed hemorrhoids typically occur in the external component but in severe cases can go on to involve the internal hemorrhoids as well. Thrombosed hemorrhoids can occur in patients who have had minimal hemorrhoidal symptoms in the past.

It is important to keep in mind the wide differential diagnosis in patients presenting with anorectal complaints (Table 12-1). Although many of these patients will indeed be found to have hemorrhoids, fissures, or fistulas, they may also harbor a more ominous diagnosis such as anal or rectal carcinoma. The practitioner should keep an open mind and consider other possibilities such as condyloma, Crohn's disease, proctitis, Paget's disease, or other types of dermatoses.

Evaluation and Physical Examination

History

A careful history should be done to guide the clinician to an accurate diagnosis. In addition, it is helpful to know which symptoms bother the patient the most. In some circumstances the patient is satisfied just to know that their symptoms are related to hemorrhoids and not something more serious. Part of the history should include the patient's bowel habits. If a patient has constipation, treatment of the constipation will be an important part of the treatment plan. Ulcerative colitis and Crohn's disease need to be considered in patients that have had significant diarrhea. If there has been a significant change in bowel habits, one also has to consider the many possibilities that can lead to this change.

For patients with rectal bleeding, the nature, color, and intensity of the bleeding should be noted. If also accompanied by a change in bowel habits, one needs to be suspicious of a malignancy or inflammatory bowel disease.

If pain is a significant component of the presentation, the intensity, frequency, and duration of the pain should be noted. If the pain is severe and described as a tearing sensation primarily at the time of the bowel movement, an anal fissure should be considered. Pain that is constant and has been present for days at a time should elicit consideration of a thrombosed hemorrhoid or perianal abscess as the underlying diagnosis.

Protrusion or swelling in the rectal area can be many different things. If the protrusion has been present constantly for weeks, months, or even years, it can be something as simple as a skin tag. However, one needs to also be mindful of diagnoses such as condyloma and neoplasm in this situation.

Physical Examination

A general physical examination should be conducted with concentration on the abdomen, groin, and perianal area. Typically the patient will be examined in the supine position first before switching to a prone jackknife or left lateral (Sims) position (Figure 12-4). It is important to be as reassuring as possible during this examination as it is inherently embarrassing and uncomfortable. It is always helpful to explain the steps of the examination so as to minimize surprise and discomfort.

The examination begins by gently spreading the buttocks and inspecting the skin, perineum, and the external anal opening. Anal fissures are usually diagnosed just with these simple measures, but if one is not thinking of this possibility,

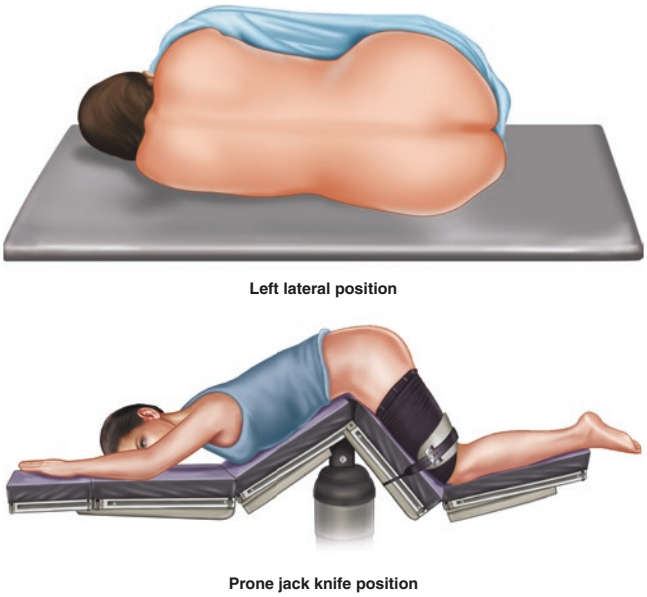

FIGURE 12-4. Patient positioning. (**a**) Left lateral position. (**b**) Prone jackknife position.

it is easy to miss a fissure. In addition, many other conditions can be identified: dermatitis, fistulas, abscess, anal cancer, skin tags, and condyloma. A digital rectal exam is then performed to assess for masses, pain, and sphincter tone. If there is any component of fecal soiling or incontinence, the sphincter tone should also be investigated by asking the patient to voluntarily squeeze during the digital exam.

Anoscopy is required to fully assess the hemorrhoids (see Figure 4.3). It is important that the anoscope is slotted or allows for side viewing to give the best view of the internal hemorrhoids. Asking the patient to bear down with the anoscope in place can give a better assessment of the severity of the hemorrhoidal problems and specifically the degree of prolapse.

Many patients should also undergo at least a rigid proctoscopy. This allows the surgeon to rule out malignancies or inflammatory conditions that could be mimicking hemorrhoids. This is especially true in older patients with bleeding, weight loss, anemia, or change in bowel habits.

The patient who presents with rectal bleeding should always be considered for full evaluation of the colon. An accurate history is very helpful in determining the need for colonoscopy. The young patient with typical hemorrhoidal bleeding that responds to treatment and with no family history of colon cancer likely does not need further evaluation. In a large series of classic "outlet" bleeding, colonoscopy revealed adenomas in less than 2% and no cancers in patients less than 50 years of age. When considering all age groups, 6.7% of the patients had a significant lesion (e.g., cancer, large polyps, or carcinoma in situ) [17]. Despite this evidence, some clinicians will still recommend colonoscopy in any patient over 40 years of age regardless of the type of bleeding.

Treatment

Treatment aggressiveness is determined by the degree of symptoms. Many patients have large inflamed hemorrhoids but desire nothing other than the reassurance of an accurate diagnosis. Other patients may have symptoms that seem far worse than the physical findings would suggest. The options for the treatment of hemorrhoids can be categorized into medical management, office-based treatments, and operative therapies.

Medical Management

Dietary

The most common problem associated with hemorrhoidal disease is constipation. As a result, the main components of dietary management are geared toward minimizing constipation and consist of a high-fiber diet accompanied by an adequate fluid intake. The recommended dose of dietary fiber is 25 g (for women) to 38 g (for men) per day [18]. This amount of fiber is difficult to attain and far exceeds the mean fiber intake of Americans of 16 g per day. Despite recommendations to increase fiber intake, this figure has not changed over the last 10 years [19]. Many patients find that attempting to reach the maximum amount of fiber leads to bloating and excessive gas, and this can be a limiting factor. Along with the increased fiber, patients should also drink at least 64 oz of fluid per day. The desired outcome of the increased fiber and fluid is a soft but formed bowel movement that can be expelled with minimal effort. Meta-analysis has confirmed that fiber supplementation can alleviate hemorrhoidal bleeding but is not useful for pain, prolapse, and itching [20]. It can take up to 6 weeks for the fiber therapy to show benefit [21].

Other options are available for patients that do not do well with fiber supplementation. Stool softeners are simple and safe and can be very helpful for patients that have exceptionally hard bowel movements. Hyperosmolar laxatives such as polyethylene glycol are a good choice for those patients that do not do well with fiber supplements. The goal of these supplements is ultimately the same as for dietary fiber and water.

For the occasional patient with diarrhea, the dietary focus must change. Evaluation must be carried out to determine the etiology if the diarrhea is significant. Even in the absence of a verified diagnosis, a few basic rules can be applied to the patient with diarrhea. In general, the diet should be high in fiber and low in fat content; caffeine, alcohol, and spicy foods are known to exacerbate diarrhea. Loperamide can be very useful to minimize diarrhea in patients with irritable bowel syndrome.

In many patients, the hemorrhoidal symptoms are tied into their toileting habits. The dietary changes mentioned above are designed to minimize straining and time spent on the toilet. Some patients will continue to have excessive straining time on the toilet despite having soft bowel movements. In this situ-

ation, the diagnosis of the obstructed defecation syndrome (ODS) should be considered. ODS will not respond to any type of surgical treatment of hemorrhoids and, in the ideal situation, would be recognized and treated at the outset.

Sitz baths are often used as part of the treatment for hemorrhoids. They are designed to decrease pain, burning, and itching following a bowel movement. They can also aid in hygiene as well as decrease anal canal pressures. Sitz baths tend to be more useful when warm water is used and when performed in the acute setting such as with a thrombosed hemorrhoid or an acute flare-up of hemorrhoidal disease [22]. Some patients with disabilities can have difficulty using them due to an inability to get in and out of a bathtub. In these situations, a portable sitz bath or even a warm shower can be useful. As comfortable as they can be, excessive use can lead to macerated skin and even more discomfort. Soaking time should be limited to 10–15 min two to three times per day.

Topical Therapies

Medical treatments such as topical ointments and suppositories deserve comment. Any trip to a local pharmacy will confirm that there is a vast array of over-the-counter hemorrhoidal treatments. Many of these products will combine a barrier protectant with some other active ingredient. The active ingredients can include vasoconstriction agents, local anesthetics, anti-inflammatory agents, and astringents [23]. There is very little science to support the use of these agents; however, some patients do claim to get relief from these products, and there appears to be little or no harm in their use.

A different approach to treating hemorrhoidal symptoms has been the use of topical nitrates, which have been shown to be beneficial in patients with high sphincter tone and hemorrhoids [24]. Calcium channel blockers are reported to be helpful in the setting of acute thrombosed hemorrhoids [25]. Since both are known to decrease internal sphincter tone, this may be the mechanism of action.

Patients will also sometimes try suppositories or will have them recommended by one of their caregivers. Similar to the ointments described above, suppositories are usually a combination of several different agents. Despite the fact that suppositories are difficult to maintain in the correct anatomic location, some patients do get relief with their use.

Oral Therapy

Flavonoids are a type of plant-based phlebotonics that were first described in the treatment of chronic venous disease and edema. They are reported to increase vascular tone, reduce venous capacity, decrease papillary permeability [26], increase lymphatic drainage [27], and have anti-inflammatory effects [28]. When used as oral therapy for hemorrhoids, a meta-analysis has shown decreased bleeding, pain, and itching with their use [29, 30]. However, many of these agents are not available in pharmaceutical grade in the United States. Calcium dobesilate is one of many synthetic phlebotonics. This agent has also been shown to be effective in decreasing bleeding and inflammation in hemorrhoids [31].

Office-Based Treatments

There are a number of treatments for hemorrhoids that can be carried out in the office. With the exception of a local excision of a thrombosed hemorrhoid, these treatments are all designed to be used for internal hemorrhoids. The relative lack of somatic innervation of the internal hemorrhoids allows such treatments to be considerably less painful than excisional treatments of the external hemorrhoids. Treatments that will be discussed are rubber band ligation, infrared coagulation, and sclerotherapy.

Rubber Band Ligation

Barron first described rubber band ligation of internal hemorrhoids in 1963 [32]. Even before that time, hemorrhoids had been tied off with various types of threads and ligatures [33]. Since Barron's description, it has become one of the most widely used techniques for the treatment of internal hemorrhoid problems. By applying a rubber band at the apex of the internal hemorrhoid, the hemorrhoid is fixed high in the anal canal, correcting the prolapse, and by decreasing the blood flow caudally, the hemorrhoids shrink in size.

The technique of rubber band ligation is straightforward but still must be done with care in order to minimize discomfort (Figure 12-5). No special preparation is required although some surgeons recommend an enema prior to the procedure. The patient is placed in either the prone jackknife or left lateral decubitus position depending on surgeon choice. Anoscopy is then done to determine which hemorrhoids will be banded. An assistant and adequate lighting are critical to get optimal visualization so that the procedure can be done precisely and with little discomfort to the patient. There are a number of different banders available (Figure 12-6). Some banders utilize a grasp, while others use suction to pull the internal hemorrhoid into the banding instrument.

Once the bander is in place, the rubber band is deployed to place it at the base of the internal hemorrhoid. It is important to place the band at least 1–2 cm above the dentate line. The anal transitional zone contains a variable amount of innervation, and bands placed in this area can cause significant pain. Even when proper precautions are taken and the hemorrhoid bands are placed in the appropriate anatomical site, there can be significant pain. Anywhere from 1 to 3 bands can be done at the same setting. Lee et al. found that placing multiple bands increases pain, urinary retention, and vasovagal reactions [34]. Maria et al. also found increased pain with multiple bands [35], and others have noted very similar complication rates [36, 37].

Postoperative care is straightforward. Patients can resume a normal diet and activity shortly after the procedure. They should be warned that there can be a show of blood 5–7 days following the ligation. An office appoint-

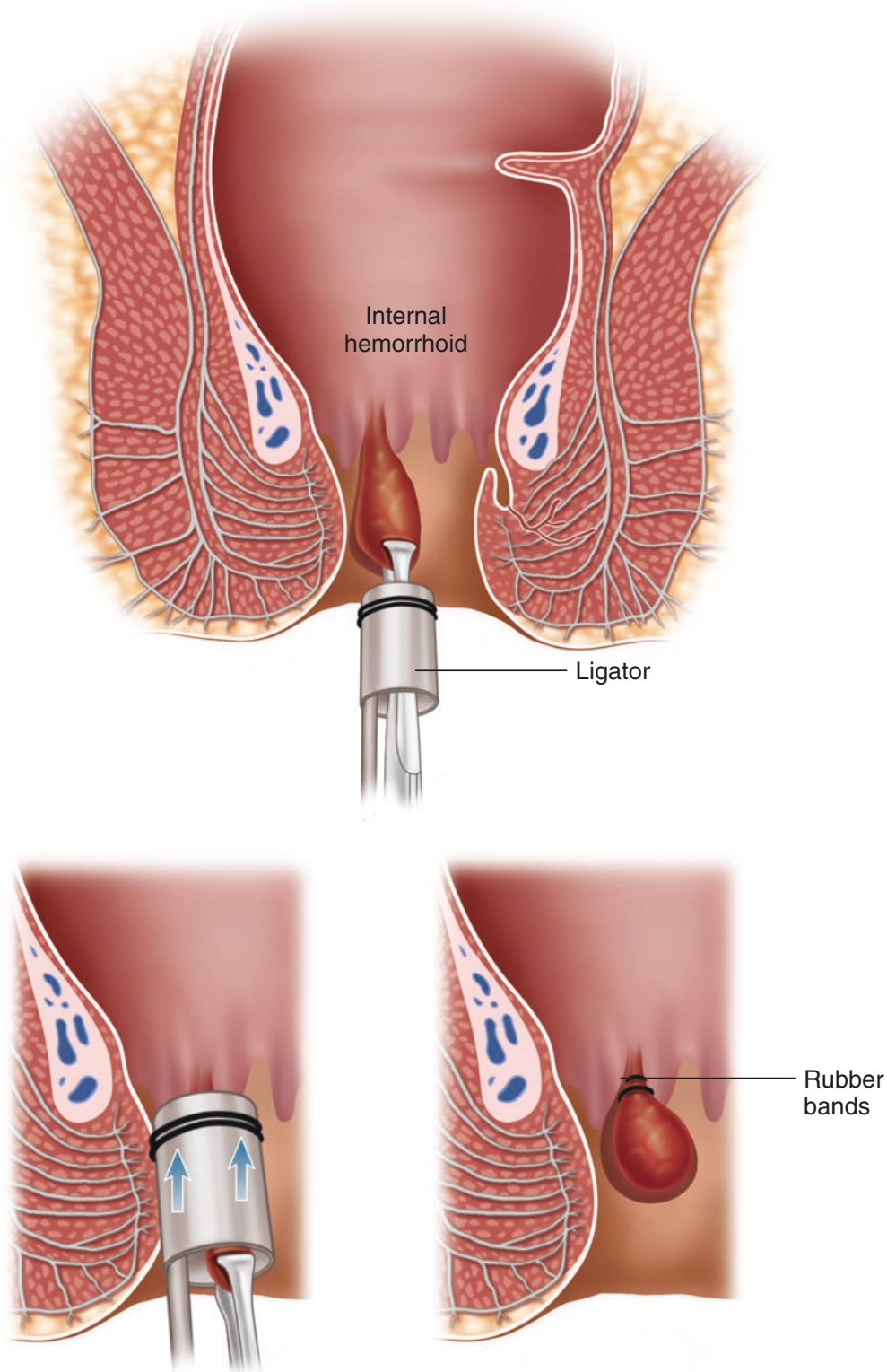

FIGURE 12-5. Hemorrhoid banding technique.

ment should be made in 2–4 weeks to evaluate the success of the banding.

Complications following banding are unusual, but the patient should be made aware of these possibilities. Delayed rectal bleeding of a significant nature occurs in approximately 1% of the patients [38]. Thrombosis can also occur especially in the remaining external component of the internal hemorrhoidal banding site [38, 39]. Abscess or urinary

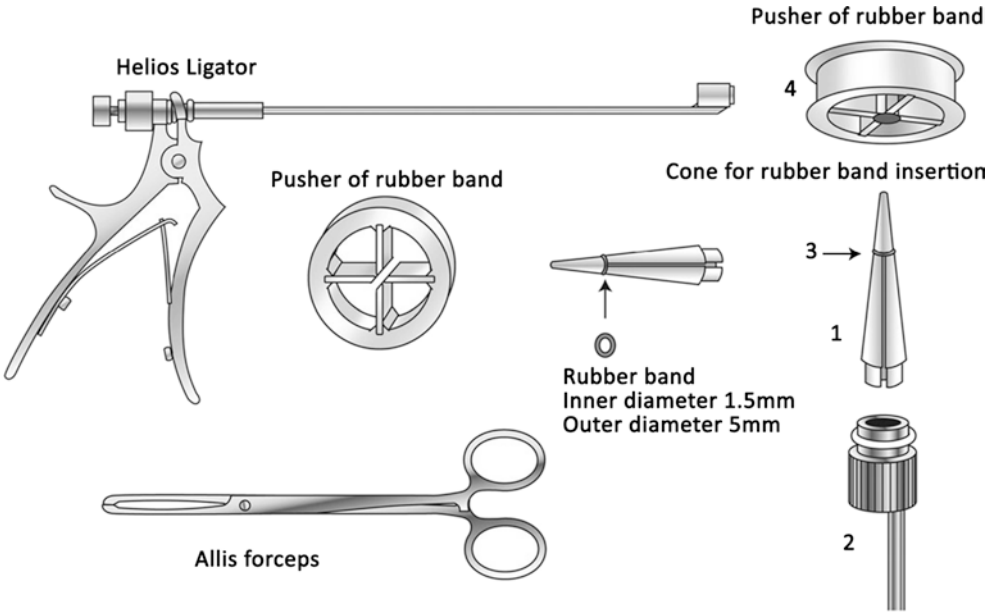

FIGURE 12-6. Hemorrhoid bander. Helio's product is easy to mount a rubber band. It uses a rubber band mounting cone (1), inserts rubber band at the end of cone (2), and pushes the rubber band to the bottom of the cone (3) using rubber band pusher (4). *With permission from Hyung Kyu Yang, Nonsurgical treatment of hemorrhoids. In: Hyung Kyu Yang, ed. Hemorrhoids. Springer, New York, 2014; pp: 47–63.© 2014 Springer.*

dysfunction is very rare [39]. A potentially devastating complication is pelvic sepsis. Although rare, several fatal cases have been reported [40–42].

Sepsis associated with hemorrhoidal banding usually presents with the triad of symptoms: increasing pain, fever, and urinary retention. Any clinician who does hemorrhoidal banding should be aware of this potential complication and be ready to treat it aggressively if it does occur. CT scan of the pelvis may illustrate air outside the rectum and/or inflammation. The diagnosis can also be made in the operating room with an exam under anesthesia. In earlier recognized and milder cases, debridement of the wound with intravenous antibiotics may suffice. In more severe cases, laparotomy with diverting colostomy and pelvic drainage may be necessary.

Rubber band ligation is very effective for the treatment of grade 1–3 hemorrhoids. Meta-analysis of multiple studies reveals that banding is the most effective non-excisional treatment available [43–45]. It should be noted, however, that 18–32% of patients require repeat treatments when followed long term [46, 47]. Still, many patients will find this to be a very acceptable alternative to the excisional treatments.

Infrared Photocoagulation

Energy ablation can be used to treat internal hemorrhoids; these options include infrared photocoagulation, bipolar diathermy, and direct current electrotherapy. Infrared photocoagulation is the most commonly used of these methods (Figure 12-7). Many of the concepts of rubber band ligation apply for infrared photocoagulation as well. Namely, ischemia of the internal hemorrhoidal vascular complex leads to scarring and fibrosis in the normal anatomic location [48]. Infrared radiation generates heat that coagulates protein and creates an inflammatory bed. The radiation is applied to the internal hemorrhoid typically at four different locations on

FIGURE 12-7. Infrared photocoagulation machine. *With permission from Hyung Kyu Yang, Nonsurgical treatment of hemorrhoids. In: Hyung Kyu Yang, ed. Hemorrhoids. Springer, New York, 2014; pp: 47–63. © 2014 Springer.*

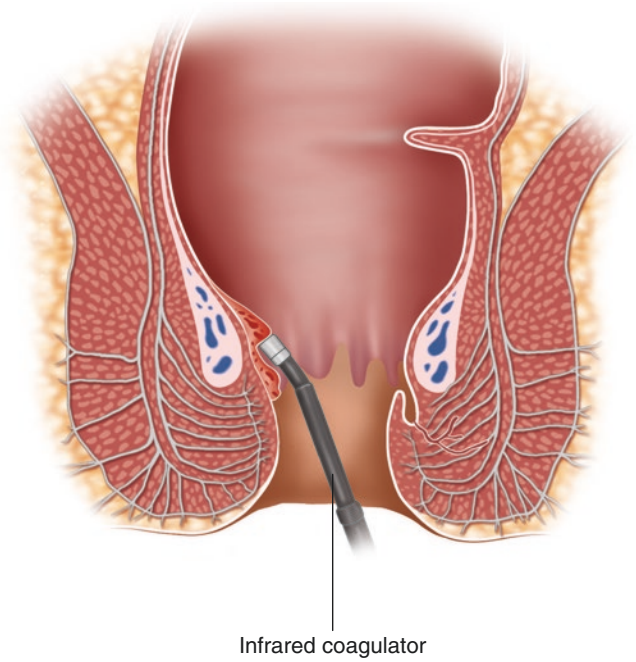

FIGURE 12-8. Infrared photocoagulation technique.

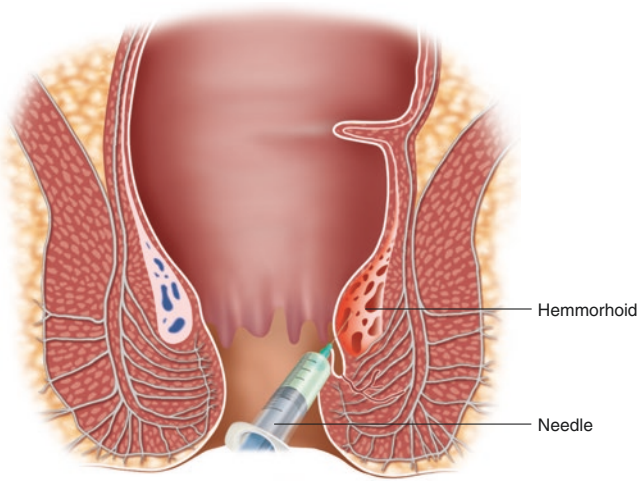

FIGURE 12-9. Sclerotherapy technique.

each hemorrhoidal complex. The depth of penetration is approximately 3 mm and leads to heat necrosis that causes tissue destruction and eventually fibrosis and scarring.

Positioning in preparation for this procedure is identical to that for hemorrhoidal banding and is based on physician preference (Figure 12-4). Once the patient is positioned, the tip of the infrared coagulator is used 3–4 times at the apex of each internal hemorrhoid. Each application of the photocoagulation is done for 1–1.5 s (although the device allows a range of 0.1–3 s) (Figure 12-8). The precise location of the treatment is just as important as it is for hemorrhoidal banding. If the treatment is done too low or too close to the dentate line, there will be significant post procedure pain. There is usually minimal discomfort once the treatment is complete, and all three hemorrhoid complexes can be treated at the same session [49].

Infrared coagulation is most effective for first- and second-degree hemorrhoids and may be less painful than hemorrhoidal banding [50]. While very effective for the treatment of bleeding, it is less useful for treating significant prolapse of hemorrhoids [41, 51]. Complications are rare following infrared photocoagulation and consist primarily of pain and bleeding due to excessive application of energy.

Bipolar diathermy and direct current electrotherapy have also been reported to be used in the same fashion as infrared coagulation. Bipolar energy does not penetrate as deeply as monopolar energy, and success rates for bipolar diathermy treatment have been reported from 88 to 100% [52]. Despite the good success rates, it has been noted that up to 20% of patient may require an operative surgical excision for hemorrhoid prolapse [53]. Neither energy ablation technique has been as popular as infrared coagulation.

Sclerotherapy

Injection sclerotherapy was first attempted by John Morgan in 1869 [54]. The concept is analogous to that for infrared photocoagulation and hemorrhoidal banding: this solution is injected at the apex of the internal hemorrhoid complex which leads to scarring and fibrosis and, ultimately, to fixation of the internal hemorrhoidal complex. Many different agents have been tried including phenol, carbolic acid, quinine in urea, sodium morrhuate, and sodium tetradecyl.

The positioning of the patient, exposure, and placement of the sclerosing agent are identical to infrared coagulation. A spinal needle is used to place approximately 1–1.5 mL of the agent in a submucosal fashion at the apex of the internal hemorrhoid (Figure 12-9). The precise injection location into the submucosal space is important as placement too superficial can cause mucosal sloughing, while placing it too deep leads to more risk of infection, abscess, or significant pain. This complication usually occurs due to injection into a surrounding, unintended space [55]. Urinary retention and impotence postinjection sclerotherapy have also been reported [56].

Sclerotherapy is reported to be highly successful but is still not quite as effective as rubber band ligation especially for grade 3 hemorrhoids [57]. The best role for sclerotherapy may be in patients that require anticoagulation since the risk of bleeding is minimal with this technique. This is due to the fibrotic reaction rather than sloughing post procedure and can be safe in patients on anticoagulation. While bleeding is very unusual (approximately 1%) following hemor-

rhoidal banding, that bleeding risk can be very significant in the anticoagulated patient, and therefore sclerotherapy should be considered an option in this patient population. Multiple repeat attempts should be avoided due to the cumulative risk of stricture.

Operative Management of Hemorrhoids

Operative management of hemorrhoids is usually reserved for those patients who have failed medical management or have recurrent, persistent symptoms despite undergoing some of the internal hemorrhoidal treatments mentioned earlier in this chapter. Typically, only 5–10% of patients with hemorrhoidal complaints require operative hemorrhoidectomy [58]. Occasionally a patient will present with extensive thrombosed hemorrhoids or such advanced disease that it is clear from the initial encounter that a more aggressive approach is necessary. Strangulated, gangrenous hemorrhoids typically need immediate attention and operative intervention (Figure 12-10).

Excisional hemorrhoidectomy has excellent results, minimal recurrence rates, and few complications and remains the gold standard for surgical hemorrhoidal options. Unfortunately, it is also associated with significant postoperative pain. As a result, other newer therapies have been developed to treat hemorrhoids while attempting to minimize postoperative discomfort. The other primary operative management techniques include stapled hemorrhoidopexy and transanal hemorrhoidal dearterialization.

Excisional Hemorrhoidectomy-Closed Technique

Dr. Lynn Ferguson of the Ferguson Clinic first described the closed hemorrhoidectomy technique in the early 1950s [59]. It has remained the most common operation for hemorrhoids in the United States since that time [60]. A mechanical bowel preparation is not necessary, but preoperative enemas are useful to evacuate the rectum. Anesthesia can be tailored to the patient and can range from something as simple as local anesthesia plus intravenous sedation to a full general anesthesia with intubation. Positioning is per surgeon preference and includes the options of lithotomy, prone jackknife, and left lateral decubitus.

FIGURE 12-10. Strangulated, gangrenous hemorrhoids.

The operation starts with a digital exam followed by anoscopy to help clearly define which hemorrhoid complexes should be excised (Figure 12-11). Injecting the perianal skin and hemorrhoids with local anesthetic combined with epinephrine 1: 200,000 can help to decrease bleeding during the procedure. An elliptical incision is made around the hemorrhoid starting at the perianal margin, and a proportional incision should be made so that the length of the incision is approximately 3–4 times longer than its breadth. The hemorrhoid is then elevated off the underlying sphincter muscle fibers. It is useful to place the hemorrhoid under tension to facilitate this dissection. The dissection is carried out past both the external and internal component of the hemorrhoid. Sharp dissection with the scissors or scalpel or even electrocautery can be done to dissect the hemorrhoidal tissue off the underlying sphincter complex.

At the apex of the hemorrhoid, the vascular pedicle is then clamped and then the hemorrhoid excised. The vascular pedicle is then suture ligated with an absorbable suture; the same suture is then used to reapproximate the tissue. As the wound is closed, small bites of the underlying sphincter muscle can be taken in order to close the dead space. If the dissection is relatively bloody, a running locked stitch can be used to maximize hemostasis. Once the first hemorrhoid complex is excised, the remaining hemorrhoidal bundles can be examined to determine if they still need to be excised.

When multiple hemorrhoids are removed, it is important to maintain adequate skin and tissue bridges between the excision sites to minimize the risk of postoperative anal stenosis [61]. If one can still place a medium-sized Hill Ferguson retractor at the end of the procedure, then there is usually very minimal risk of anal stenosis.

A notable variation on the technique is the use of energy devices such as the LigaSure bipolar device or the harmonic device which both can be used to perform the excisional hemorrhoidectomy. The excision and dissection is done in the same fashion. It has been reported that there may be less postoperative discomfort following this approach and will be discussed in more detail later [62].

Excisional Hemorrhoidectomy Open Technique (Milligan–Morgan)

The open technique of excisional hemorrhoidectomy is very popular in the United Kingdom. This technique results in a very similar excision as the Ferguson technique except that the wounds are not closed other than suture ligating the vascular pedicle [63].

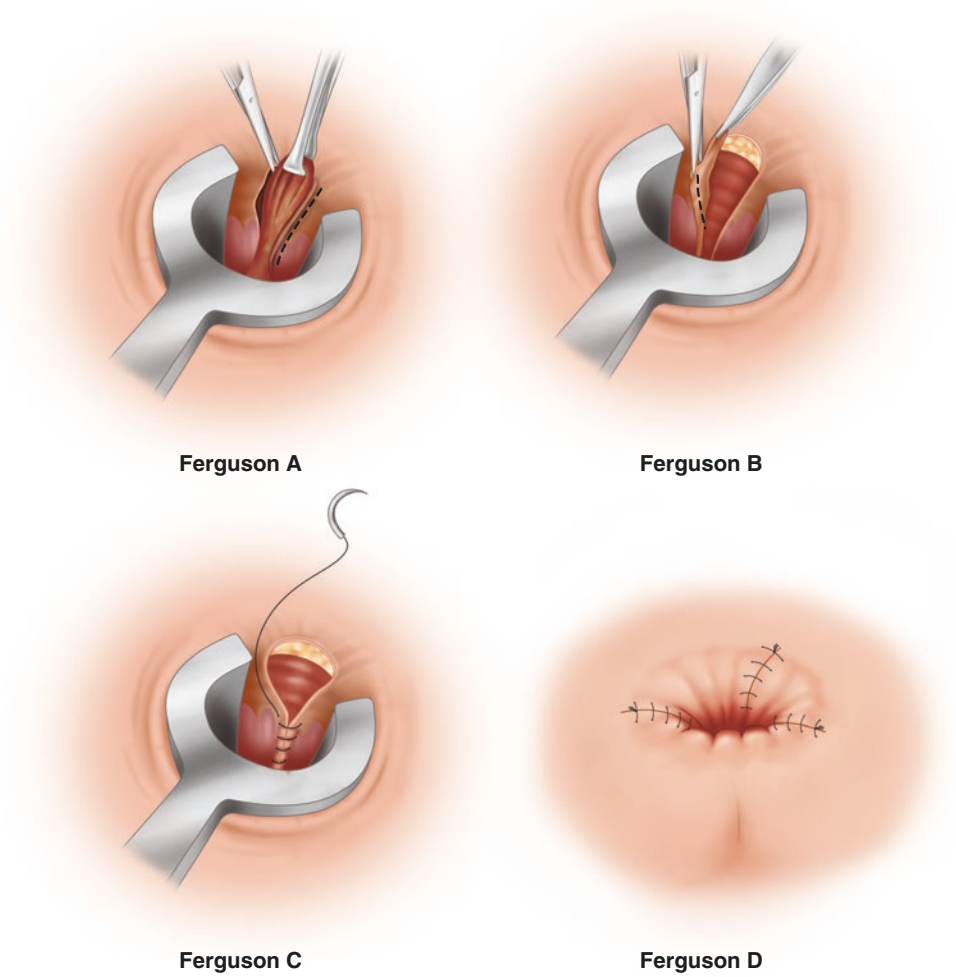

FIGURE 12-11. Closed hemorrhoidectomy.

The operation commences in a very similar fashion as the Ferguson closed hemorrhoidectomy technique. First, the external hemorrhoidal tissue is grasped, followed by the internal hemorrhoidal tissue and retracting them in a caudal fashion. An excision is then made at the perianal skin and extended into the anal canal. During the dissection it is of utmost importance to leave the sphincter muscles undisturbed. The apex of the vascular pedicle is then suture ligated and the hemorrhoid excised. The excision sites are then left open and allowed to granulate in (Figure 12-12).

Excisional Hemorrhoidectomy (Circumferential or Whitehead)

The Whitehead hemorrhoidectomy was designed to completely remove all the hemorrhoids at the time of surgery [64]. A circumferential incision is made at the level of the dentate line, and then the submucosal and subdermal hemorrhoidal tissues are dissected out and removed. Any redundant rectal mucosa is excised, and then the remaining proximal rectal mucosa sutured down to the anoderm. This operation is not in common use at this time due to the complication of a Whitehead deformity (Figure 12-13) [65].

Results of Hemorrhoidectomy

Excisional hemorrhoidectomy remains the gold standard for the long-term relief of hemorrhoidal symptoms. Although there are few longitudinal studies, MacRae et al. performed a meta-analysis that confirmed there is very little need for further treatment and that symptoms were well controlled [44].

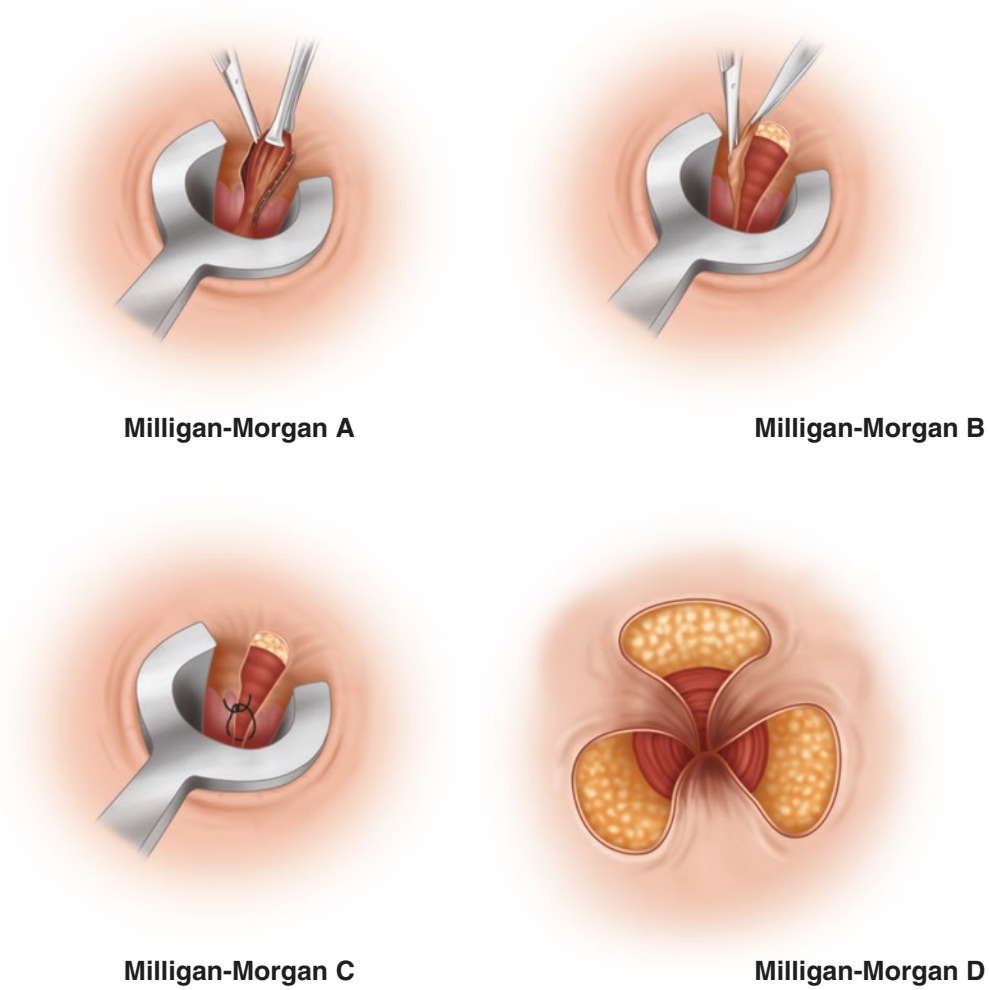

FIGURE 12-12. Open hemorrhoidectomy.

FIGURE 12-13. Whitehead deformity. Courtesy of American Society of Colon and Rectal Surgeons.

Although there has been considerable controversy over the relative merits of opened versus closed techniques, careful analysis in randomized, prospective trials suggests that there is very little difference between the two techniques [66–69]. One meta-analysis reviewed six trials with almost 700 patients and found no differences in cure rates, length of stay, maximum score, or complication rates [70].

The discomfort with hemorrhoidectomy has led to a search for less painful alternatives [71]. One such approach has been to use energy sources such as the harmonic scalpel or the LigaSure for the tissue dissection. A Cochrane review was done to compare LigaSure hemorrhoidectomy to excisional hemorrhoidectomy [72]. This review confirmed that the early postoperative pain was less when LigaSure™ (Covidien, CT) was used, but this difference disappeared by postoperative day 14. LigaSure hemorrhoidectomy was also found to be slightly faster. The same benefits appear to apply to Harmonic Scalpel™ (Ethicon, Brunswick, NJ) hemorrhoidectomy [73]. It is not clear that the increased cost of the LigaSure device or Harmonic Scalpel device would be offset by the decreased operating room time. Both LigaSure and Harmonic seem to offer patients less postoperative pain, but long-term follow-up data is not yet available. Other approaches in an attempt to decrease pain such as diathermy and the use of lasers have not shown any significant difference [74–76].

There have been other efforts to decrease the pain associated with hemorrhoidectomy. Mathai et al. described doing lateral internal sphincterotomy at the same time as the hemorrhoidectomy [77]. This additional procedure did decrease pain likely by minimizing the sphincter spasm associated with postoperative pain, but division of the sphincter muscle has prevented this approach from being widely accepted. Topical nitroglycerin has also been shown to decrease post hemorrhoidectomy pain [78]. Both oral and topical metronidazole have also been shown to decrease pain although the mechanism is not clear [79].

Complications of Hemorrhoidectomy

Urinary Retention

Urinary retention is one of the most common complications following hemorrhoidectomy and can increase hospital stay [80]. Zaheer found that disease severity, namely, number of quadrants excised, and analgesia requirements were both important risk factors for those patients who underwent hemorrhoidectomy. Although the exact reasons for this complication are not known, it is clear that both fluid restriction and pain control in the perioperative period is important to prevent this complication [81, 82]. There have been a few reports indicating that the stapled hemorrhoidectomy (PPH) is associated with a lower incidence of postoperative urinary retention [83].

Postoperative Hemorrhage

Postoperative hemorrhage is one of the more common complications after hemorrhoidectomy, although the risk is still relatively low. Bleeding typically occurs during one of two time frames post surgery. In approximately 1% of cases, the bleeding will occur in the immediate postoperative period. When this bleeding occurs, it is usually the result of a technical error and most commonly requires a return to the operating room for an exam under anesthesia and control of the bleeding.

Delayed hemorrhage can occur in up to 5.4% of patients and will typically occur 7–10 days after surgery [84, 85]. Post hemorrhoidectomy bleeding has been attributed to sepsis of the ligated pedicle in the past, although Chen et al. found that male patients and the operating surgeon may be risk factors in delayed post hemorrhoidectomy bleeding [86]. If postoperative hemorrhage occurs, immediate packing of the anal canal or tamponade with a Foley balloon catheter will control the bleeding. If the bleeding does not stop, then an exam under anesthesia may be warranted. Patients that require a trip to the operating room can be determined with the aid of rectal irrigation [87]. However, return to the operating room to investigate and control the bleeding is always a safe option.

Anal Stenosis

Anal stenosis can occur if excessive anoderm is removed at the time of the hemorrhoidectomy. The most common setting for this is when an emergency hemorrhoidectomy is done for prolapsed thrombosed hemorrhoids, and inadequate skin bridges remain post surgery. Treatment can be as simple as the use of bulk laxatives but may require dilation and or anoplasty (Figure 12-14) [88, 89].

Postoperative Infection

Postoperative infections are surprisingly uncommon. The risk of postoperative infection occurs less than 1%, but the rate may be underreported due to abscesses spontaneously decompressing. In the rare circumstance when an abscess or cellulitis occurs, it requires operative drainage and/or antibiotics as needed [90]. Prophylactic antibiotic therapy is not indicated for elective hemorrhoid surgery [91].

Fecal Incontinence

Fecal soiling or incontinence can occur following hemorrhoidectomy but is rather unusual. The etiology could be due to a combination of things like sphincter stretch during the procedure due to retraction, direct injury to the sphincter complex, or loss of the hemorrhoidal piles that have been thought to contribute approximately 10–15% of continence.

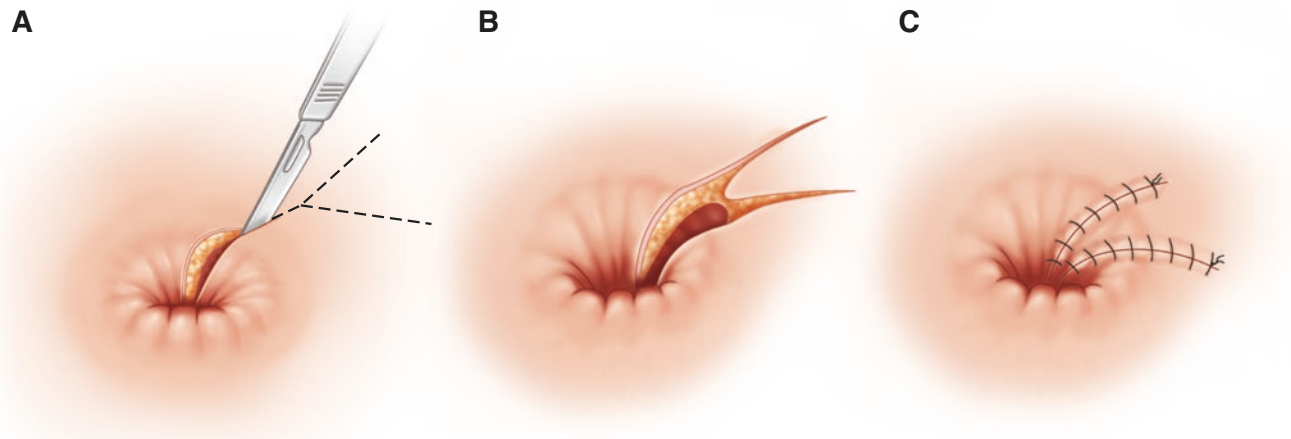

FIGURE 12-14. Y-V Anoplasty.

FIGURE 12-15. Stapled hemorrhoidectomy (PPH). *With permission from Schwandner O. Procedure for Prolapse and Hemorrhoids* (*PPH*; *Stapled Hemorrhoidopexy*). *In*: *Wexner SD*, *Fleshman JW. Colon and Rectal Surgery*: *Anorectal Operations. Wolter Kluwers*, *2011*. *© Copyright Wolters Kluwer 2011*.

Stapled Hemorrhoidopexy

Stapled hemorrhoidopexy was developed in Italy as an alternative form of operative therapy for hemorrhoids [92, 93]. It would be mistaken to refer to this procedure as a "hemorrhoidectomy" but is usually referred to as a procedure for prolapse using a hemorrhoidopexy technique (Figure 12-15). In this procedure, an end-to-end circular stapler is used to excise a circumferential ring of internal hemorrhoids, which includes the mucosa and submucosa above the dentate line (Figure 12-16). The result of the operation should be that the remaining hemorrhoids are pulled up into the anal canal and fixed in place. Some of the blood supply to the remaining hemorrhoids is also interrupted so that there is less engorgement of the remaining hemorrhoids.

Because the operation occurs above the dentate line, there has been reported less postoperative pain compared to a hemorrhoidectomy [94–96]. Indications for stapled hemorrhoidopexy include patients with second- or third-degree hemorrhoids who have failed previous nonoperative methods or have severe enough internal disease to go directly to a more aggressive approach. It is generally not used for patients with fourth-degree hemorrhoids or for thrombosed prolapsed hemorrhoids; however, some data do support this procedure in fourth-degree hemorrhoids if they can be reduced in the operating room [97].

Preparation for this operation is the same as for an excisional hemorrhoidectomy. As part of the kit that is provided with the circular stapler, there is a disposable circular translucent anoscope. With the anoscope in place, a purse-string suture is placed in a circumferential fashion into the submucosa approximately 2 cm above the transitional zone. The head of the stapler (similar to an EEA, but the head is not detachable) is then introduced into the rectum past the purse-string suture. The purse string is tied down around the stapler, and then the anvil is very slowly closed while giving gentle traction on the purse-string suture externally. Once closed, the stapler is fired and then removed along with the excised tissue. The staple line should be inspected carefully for bleeding as this is a common occurrence and may require suture ligation. In female patients the vagina should be inspected and palpated prior to firing the instrument to ensure that there is not a cuff of vaginal tissue included within the stapler.

Soon after the stapled hemorrhoidopexy technique was described, a number of randomized controlled studies were done that confirm there was significantly less postoperative pain compared to excisional hemorrhoidectomy and with equal relief of hemorrhoidal symptoms [94–96].

More long-term follow-up is now being accumulated on patients who have undergone the stapled hemorrhoidopexy. A recent Cochrane review was performed looking at seven trials with 537 patients comparing stapled hemorrhoidopexy to excisional hemorrhoidectomy. Patients undergoing excisional hemorrhoidectomy had fewer recurrences of prolapse and fewer symptoms than those undergoing stapled hemorrhoidopexy [98].

The multiple studies on hemorrhoidopexy confirm that it is a safe alternative to excisional hemorrhoidectomy; however, there are some unique complications that have been reported with this procedure including rectal perforation, persistent rectal pain, retroperitoneal sepsis, rectal obstruction, and rectovaginal fistula. The complication rate is similar between stapled hemorrhoidectomy and conventional hemorrhoidectomy, but stapled hemorrhoidectomy is associated with a higher rate of recurrent disease [99].

Transanal Hemorrhoidal Dearterialization

Transanal hemorrhoidal dearterialization is a relatively new technique first described by Morinaga in 1995 (Figure 12-17) [100]. Doppler is used to guide ligation of the arterial inflow to the hemorrhoids. Although not initially described, suture rectopexy can be done at the same setting to minimize prolapse.

Patient preparation and setup is identical to that for an excisional hemorrhoidectomy. Once proper anesthesia and positioning is accomplished, a specialized anoscope with a Doppler is introduced into the anal canal (Figure 12-18). The Doppler is used as the anoscope is rotated until one of the feeding arteries is identified and suture ligated. The Doppler can also be used to confirm that the artery was adequately ligated. The anoscope is rotated until all of the significant arteries are identified and ligated (generally 4–6 arteries, but this can be quite variable). Depending on the need to correct the prolapse, a suture mucopexy can be performed immediately following the ligation using the same stitch.

The arterial ligation and mucopexy are all done above the dentate line so one would anticipate that the pain would be less following this procedure when compared to excisional hemorrhoidectomy. Early studies seem to confirm that this procedure is less painful than a hemorrhoidectomy and equally as safe [101–104]. There seems to be a relative lack of good data to support this procedure. Giordano performed a systematic review of the available studies in 2009, and although there were 17 trials with 1996 patients, only one of these trials was a randomized controlled study. It was felt

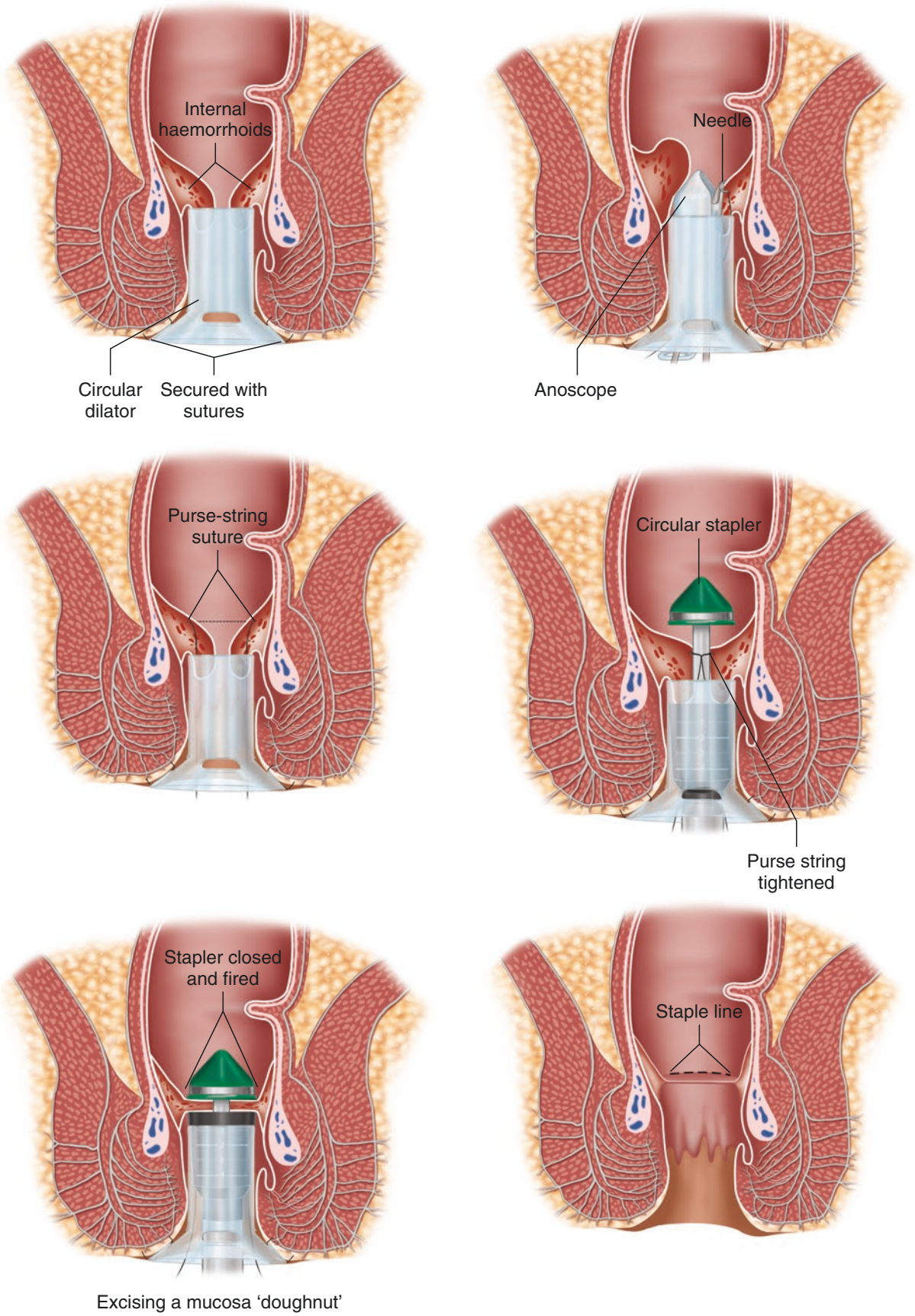

FIGURE 12-16. Stapled hemorrhoidectomy technique.

FIGURE 12-17. Transanal hemorrhoidal dearterialization device.

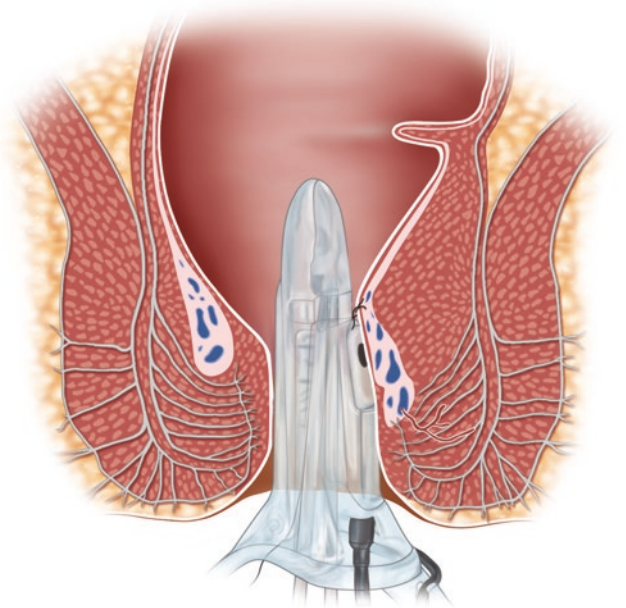

FIGURE 12-18. Transanal hemorrhoidal dearterialization technique.

that the quality of the studies included in this review was low overall. It appears to be a safe alternative with a recurrence rate of 10.8% for prolapse, 9.7% for bleeding, and 8.7% for pain at defecation at follow-up of 1 year or more [105].

Special Clinical Scenarios

Thrombosed External Hemorrhoid

A patient with acute thrombosed external hemorrhoids usually presents with the acute onset of anal pain along with a hard lump in the perianal region (Figure 12-3). Although the patient may describe a possible precipitating event, such as constipation or excessive straining, most of the time the thrombosis can occur for no apparent reason. The perianal pain and discomfort is constant and can be worse around day 3 or 4. If the patient delays long enough, the thrombosis can sometimes cause pressure ulceration and eventually skin necrosis leading to a spontaneous evacuation of the clot. In these cases, the patient will usually describe an immediate relief of the pain.

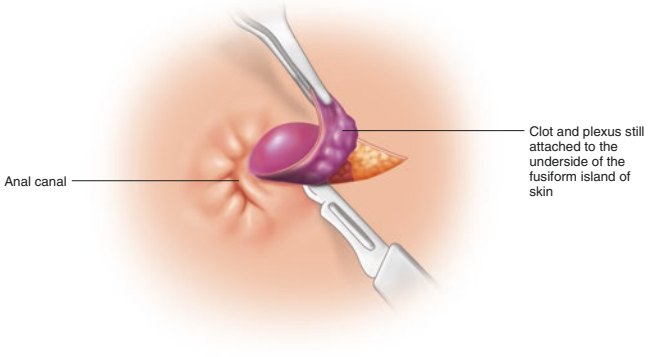

FIGURE 12-19. Enucleation of the thrombosed hemorrhoid.

The aggressiveness of the treatment is primarily driven by the patient's symptoms. Regardless of the size of the thrombosis, if the patient is relatively comfortable, it is usually best to allow the thrombosis to simply resolve on its own. On the other hand, many patients present to the physician's office due to severe, unrelenting pain, and in this circumstance, enucleation of the thrombus can be very helpful.

This procedure can usually be done under local anesthesia in the office although some patients may require sedation or even general anesthesia (Figure 12-19). In the office setting, local anesthesia can be used at the level of the thrombosed hemorrhoid. Once anesthetized, the skin should be excised overlying the thrombosis to allow as much of the clot to be removed. Bleeding is usually not troublesome and can be controlled with pressure, silver nitrate, and suture ligation if necessary. The wound can be left open or closed with absorbable sutures, depending on the preference of the surgeon (see Video 12-1) [106].

Strangulated (Thrombosed Prolapsed) Hemorrhoids

Strangulated or thrombosed, prolapsed hemorrhoids are internal hemorrhoids that are both incarcerated and irreducible (Figure 12-10). Patients typically have a previous history of prolapsing hemorrhoids and will present with an acute episode of pain and protrusion that is no longer reducible. They may also complain of urinary retention and referred pain. A thorough physical examination will demonstrate

both prolapsed incarcerated internal hemorrhoids and thrombosed external hemorrhoids. A significant amount of edema may be present and, if left untreated, may progress to ulceration, necrosis, and eventually gangrene.

Enucleation of the thrombus is inadequate treatment and not appropriate for this clinical scenario. Treatment usually consists of an urgent excisional hemorrhoidectomy in the operating room. The excisional hemorrhoidectomy can be performed in an open or closed technique, although some recommend an open technique in the face of necrosis. A newer option may include the bipolar device hemorrhoidectomy.

An alternative treatment option, if the patient does not wish to go to the OR or does not want surgery or if the OR is unavailable, can be performed in the office or ED setting. This includes using local anesthetic, applying pressure and/or massage to decrease the edema in the tissues, and then using a combination of rubber band ligations and thrombectomies. This will provide immediate relief for the patient and will not usually require a future surgical hemorrhoidectomy [107].

Portal Hypertension and Hemorrhoids

"Hemorrhoids" or rectal varices in patients with portal hypertension are a distinct entity compared to hemorrhoids in the general population. Rectal varices in patients with portal hypertension provide collateral circulation from the portal system into the systemic venous circulation. As previously mentioned, internal hemorrhoids drain into the middle rectal veins, then the internal iliac veins, and finally the systemic circulation. External hemorrhoids drain into the inferior rectal veins and then the internal iliac veins. The incidence of hemorrhoid symptoms in patients with portal hypertension is similar to the general population [108].

Anorectal varices are very common in patients with portal hypertension. There are reports of anorectal varices present in up to 78% of patients with portal hypertension [109]. Unlike esophageal varices, which are commonly present in this population, anorectal varices rarely bleed. Less than 1% of massive bleeding in these patients is attributed to anorectal varices or "hemorrhoids."

Treatment options for bleeding from the anorectal varices in this patient population are varied. Recommendations include conservative medical management, medical management of the portal pressures, sclerotherapy, suture ligation, stapled anopexy, and, lastly, TIPS and portosystemic shunts [110, 111].

Pregnancy

Hemorrhoid symptoms are not uncommon during pregnancy and can be exacerbated by the physiology of pregnancy, including increased circulating blood volume, impaired venous return, and change in bowel habits, namely, constipation and straining associated with labor. Usually the hemorrhoid symptoms present during pregnancy resolve after delivery and rarely need intervention. Surgical intervention is not warranted during pregnancy unless patients present with strangulated, gangrenous hemorrhoids. Local anesthesia is recommended in the left lateral position in order to rotate the uterus off of the IVC. It has been reported that only approximately 2% of pregnant women require emergent hemorrhoidectomy for strangulated hemorrhoids [112].

Crohn's Disease

Hemorrhoids can occur in patients with Crohn's disease and may require surgical attention; however, patient selection is very important. Hemorrhoid symptoms can be exacerbated in patients with Crohn's disease due to varied bowel habits, namely, diarrhea. Any anorectal surgical intervention must be performed with caution in patients with Crohn's disease due to prolonged wound healing and ulcerations. If the patient has well-controlled Crohn's disease and is not on steroids and there is little active inflammation, then Crohn's disease is not an absolute contraindication to surgical intervention. It has been reported to have a high rate of complications and can precipitate proctectomy for surgical complications not manageable with conservative means [113].

With the advent of newer medical therapies for Crohn's disease, the rate of prolonged healing and associated complications is much less. This was demonstrated in a study by Wolkomir and Luchtefeld where 90% of healing occurred in patients who underwent a hemorrhoidectomy where the ileocolic Crohn's disease was well managed. Hemorrhoidectomy, however, should not be performed in those patients with anorectal Crohn's disease or Crohn's proctitis [114].

Immunocompromised Patients

Immunocompromised patients with hemorrhoidal disease can be a very challenging and difficult clinical dilemma. Similar to the Crohn's disease population, extreme caution should be exercised when considering surgical therapies in this population. Again, poor wound healing and infectious complications are at the forefront of decision making. The HIV/AIDS population does suffer a higher degree of complications post hemorrhoidectomy [115]. Patients who are neutropenic should be offered nonoperative therapies first although the mortality rate in this patient population who undergoes a hemorrhoidectomy is not higher [116].

Symptomatic Hemorrhoids

Figure 12-20 shows a treatment algorithm for symptomatic hemorrhoids.

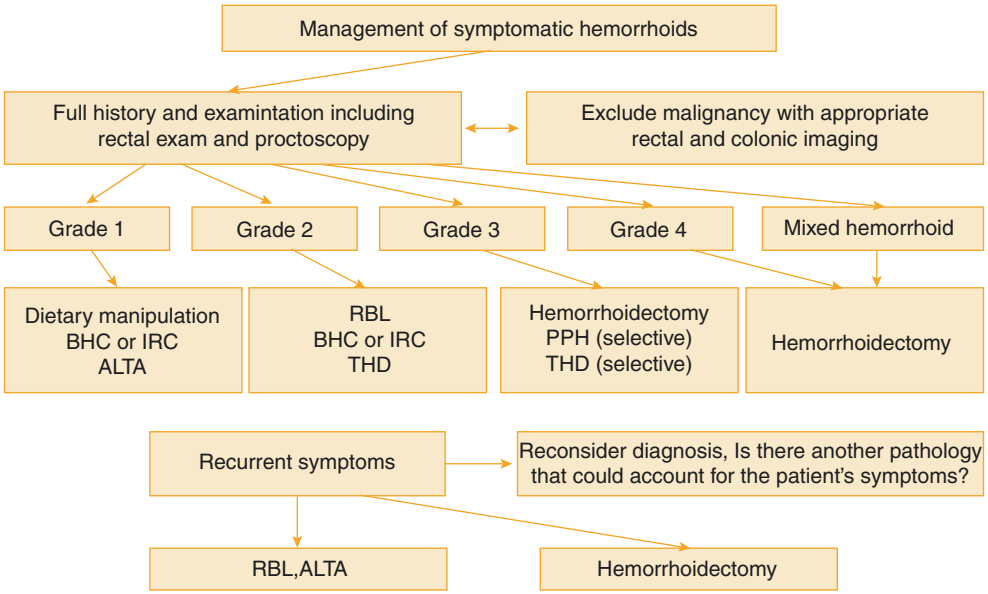

FIGURE 12-20. Treatment algorithm for symptomatic hemorrhoids. *RBL* rubber band ligation; *IRC* infrared coagulation; *THD* transanal hemorrhoidal dearterialization; *PPH* procedure for prolapsing hemorrhoids; *BHC* bipolar hyperthermic coagulation; *ALTA* Aluminum potassium sulfate and tannic acid (sclerotherapy). Adapted from Song G, Kim S. Optimal treatment of Symptomatic Hemorrhoids. J Korean Soc Coloproctol. 2011 Dec; 27(6): 277–81.

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