The Diagnosis and Management of Common Anorectal Disorders*

Approach to the Patient

One of the things that distinguishes surgeons who are comfortable and competent in the management of anorectal disease from others is their approach to the patient. Such an approach ideally should put the patient at ease and reduce the fear and embarrassment that are often associated, in the patient’s mind, with seeking care for anorectal problems. The process starts when the patient calls to make an appointment, and they are usually relieved when the self-diagnosis of “hemorrhoids” is accepted without question by the scheduling staff. When the patient first meets the physician, this is best done in a nonthreatening environment, which can be either a consultation room or an examining room that has a comfortable chair for the physician and patient, a writing desk, and examining instruments out of sight. Once the interview has been completed, the patient can then be directed to the examining table, either by the physician or by an assistant.

It is our practice to examine patients while they are lying in the left lateral decubitus position. This has a number of advantages, not the least of which is that it is much easier on the patient, both physically and emotionally. In addition, it does not require expensive and cumbersome “procto tables” and allows for storage of instruments and supplies within the side of the table itself, rather than requiring a separate cart or cabinet for these. We start the examination with the patient, fully clothed, lying supine on a standard examining table. Despite the fact that the complaints are anorectal, we examine the abdomen first to be sure there are no abdominal components of the problem, and also because it puts the patient at ease by beginning with a nonpainful, gentle, and often unexpected portion of the examination process. The clothing is loosened and only the portion being examined at the time is exposed. Once the abdominal examination is completed, the patient is placed on his or her left side, with the knees drawn up, and the anorectal area is exposed, with

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the rest of the patient being covered by either their clothing or a paper drape. The hips are moved near the edge of the examining table to bring the anorectal area closer to the examiner.

The first step in the anorectal examination is inspection, distracting the buttocks, and looking at the condition of the perianal skin, looking for the external portion of anal fissures, external hemorrhoids, sentinel tags, and any evidence of abscess or thrombosis. Sometimes a small amount of stool is present, and this can give clues as to color and consistency, as well as any evidence of seepage or incontinence.

Once the external inspection is completed, digital examination is performed. This includes assessment of sphincter tone; the height, contour, and symmetry of the sphincter; an assessment of the prostate in men; and the fingers sweeping around the top of the levator muscle and pelvic floor to palpate for masses or areas of particular tenderness. Gentle insertion of the well-lubricated index finger can usually be accomplished with minimal discomfort. In those patients with anal fissures or an otherwise tender anal area, I will often use my little finger, lubricated with a rapid-acting topical anesthetic cream such as Elamax (5% xylocaine cream), following which I will wait 30 to 60 seconds for the medication to take effect before continuing the examination.

The third portion of the anorectal examination is anoscopy, and a variety of anoscopes, both lighted and unlighted, are available. We use a Martin anoscope with an external light source, but the Welch Allyn anoscope, which attaches to the same light source as a rigid sigmoidoscope, is often helpful, particularly in the larger patient. During anoscopy, with the tip of the anoscope at approximately the dentate line, the patient is asked to strain to see whether there is much redundancy of the hemorrhoids or distal rectum.

The fourth portion of the examination is rigid sigmoidoscopy, which we perform in the unprepped patient, to assess the character of the rectal mucosa proximal to the internal hemorrhoids, to assess the character of the stool, and to look for other distal rectal pathologic conditions. We do not try to insert the sigmoidoscope proximal to the rectosigmoid junction, since this causes significant discomfort to the patient. If proximal examination is felt necessary, this is more comfortably and satisfactorily accomplished with flexible endoscopes. Using the rigid sigmoidoscope, a specimen for Hemoccult testing can be obtained from above the hemorrhoid area, if so desired. An assessment of the presence and character of any stool in the rectum can also be performed.

Following the examination, lubrication is removed from the external anal skin with a Kleenex and a gloved hand, and the patient is encouraged
to dress fully and sit once again in a chair, again across from the seated physician, for discussion of findings and options for therapy. Disease-specific brochures, such as those available from the American Society of Colon and Rectal Surgeons, are useful during the discussion, both for the diagrams that they provide as well as for the information that the patient can take home and which reinforces the conversation with the physician.

Several features deserve emphasis about this method of examination. First, by avoiding having the patient completely undress and putting on a hospital gown, time and fearful anticipation are spared, and the patient stays warmer. Second, during the examination itself, it helps for the physician to keep up a running patter, explaining to the patient each step of the examination and what the patient can expect to feel during each phase, which both distracts and reassures the patient. Third, both before and after the examination, the patient is addressed while seated comfortably, eye-to-eye and face-to-face with the physician. This avoids challenging the patient by asking them to imagine anorectal pathology, of which they have no idea, while facing away from the doctor with their bottom exposed and often being uncomfortably manipulated. An exception to this situation is the patient who obviously will need an office procedure during the same visit (eg, drainage of a perianal abscess, excision of a thrombosed hemorrhoid, or rubber band ligation of an internal hemorrhoid). These procedures are best performed, after a brief explanation, while the patient is still on the examining table, without their having to get dressed, sit down, and then get back up on the examining table and resume the same examination position. After such procedures, more complete explanation, with diagrams and other aids, should be offered.

This approach has proven respectful and reassuring to the patient, gives maximum opportunity for the patient to concentrate on and absorb the discussions about treatment options and further plans, and is achievable at minimum expense in the office of every practicing physician. Brochures and handouts that the patient can take home for further reinforcement are extremely helpful as well.

A basic set of instruments with which to perform anorectal examinations is summarized in Table 1. This represents a modest investment affordable for every practicing physician.

Symptom-Based Approach to Anorectal Disease

Initially, patients with anorectal problems can be confusing and difficult for inexperienced physicians. It is easy to attribute most anorectal complaints to “hemorrhoids” until a more thorough understanding of this area is gained. A helpful fact that aids the diagnosing clinician is that
TABLE 1. Equipment for anorectal examinations

- Sigmoidoscope and light source (disposable preferred)
- Short sigmoidoscope/lighted anoscope (fits on same light source as sigmoidoscope)
- Anoscope (we use Martin-Davis, but many options available; slotted ones are perhaps not as comfortable as cone-shaped models)
- Lubricant (tubes, not tiny packets)
- Elamox 5% cream

For minor anorectal procedures:

- Local anesthesia (we use 1% xylcaine with epinephrine and 1/4% bupivicaine with epinephrine, and frequently mix them in equal portions for faster onset and greater duration of anesthesia)
- 3 mL syringes
- #25 needles for drawing up local anesthetics from bottles
- #30 needles for administering local anesthetics
- #18 needle for the occasional aspiration of fluid
- Scalpel with #15 blade
- Hemostat
- Allis clamp
- Metzenbaum scissors
- Needle holder (or can use hemostat)
- Suture material. We use 3-0 and 4-0 chromic catgut after office excision of thrombosed hemorrhoids
- Rubber band ligator and bands
- Grasping forceps (alligator-type preferred) for use with rubber band ligator
- 4 × 4-inch gauze pads for dressings
- Paper tape

An anorectal disease manifests with a limited number of possible symptoms: bleeding, pain, itching, burning, protrusion, diarrhea, constipation, seepage, discharge, and incontinence. Of these symptoms, most patients with anorectal disease present with pain, bleeding, protrusion, or itching. Once a clinician is able to match the presenting symptoms to possible diagnoses, a relatively simple approach to anorectal disease is possible. The initial diagnosis and treatment can almost always be accomplished in the clinic, office, or emergency room settings. A need for examination under anesthesia should be the exception rather than the rule.

History

To paraphrase Sir William Osler “Listen to the patient and he will give you the diagnosis.” The initial approach to the patient with anorectal complaints should be to start with a careful and focused history. Most patients with anorectal disease are scared, embarrassed, uncomfortable, and/or nervous. A relaxed, calm, and professional manner is important in gaining trust. Anatomic models, diagrams, and pictures may help the patient in describing their conditions and are useful aids to patient
education. A quiet, comfortable, and private examination room is also helpful. Often it is useful to have a family member accompany the patient, not only to provide “an extra pair of ears” but also to relax the patient and help elaborate or clarify certain details. A symptom-based approach to the history is presented in Table 2.

A similar series of questions should be asked about other presenting symptoms. The above list is not exhaustive or inclusive, and more focused questioning should be applied to the individual’s symptoms. In the discussion below, examples are given that help to explain how to use the symptom-based approach to guide the physical examination and the decision-making process.

**Bleeding.** The differential diagnosis for bleeding includes internal hemorrhoids, rectal prolapse, anal fissure, and colorectal cancer. For many patients, occasional intermittent anorectal bleeding is a fact of life and something they have seen on and off for years. For other patients, seeing a few drops of bright red blood in the toilet bowl may be a terrifying ordeal. For both of these patients, a thorough and methodical assessment is necessary, although the expectation of the first patient may be to finally get bothersome “hemorrhoids” treated, while the second patient may be expecting an evaluation to rule out cancer.

The initial approach to the bleeding patient is to qualify and quantify the bleeding. A patient presenting with massive passage of clots, dark blood, and loose bloody stool needs a hemodynamic assessment and an evaluation to rule out more proximal gastrointestinal (GI) bleeding. A full discussion of GI bleeding is beyond the scope of this text. Anorectal bleeding usually comes from internal hemorrhoidal veins or from a tear in the anal canal. Excoriations of the perianal skin can also cause bleeding, as can eroded skin overlying a thrombosed external hemorrhoid. Associated symptoms and relationship to bowel movements will suggest the diagnosis. Anorectal bleeding that is associated with bowel movements and significant anorectal pain is an anal fissure until proven otherwise. The examination should include inspection, digital rectal examination, anoscopy, and rigid sigmoidoscopy. Perianal inspection will give information regarding the health of the perianal skin and show the presence of skin tags, external hemorrhoids, or other lesions. Gently spreading the perianal tissues should be all that is required to make the diagnosis of anal fissure.

**Anal Pain.** The differential diagnosis for anal pain includes anal fissure, thrombosed external hemorrhoid, perianal abscess, and levator syndrome. The history should provide a diagnosis in most cases, and the physical examination is used for confirmation. Any association of the pain with
TABLE 2. Symptom-based approach to the history

<table>
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<th>Symptom-based approach to the history</th>
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| Bleeding                             | When did it start?  
|                                      | How often does it occur?  
|                                      | What is the quantity of bleeding?  
|                                      | Where is it seen? (toilet paper, in the toilet, on the stools themselves, on underwear)?  
|                                      | What is the color and character of the blood?  
|                                      | Does it occur only with bowel movements?  
| Pain                                 | Where does it hurt?  
|                                      | When does it hurt?  
|                                      | When did the pain start?  
|                                      | How long does the pain last?  
|                                      | What is the character of the pain?  
|                                      | Does the pain radiate or travel?  
|                                      | Does anything make the pain better?  
|                                      | Does anything make the pain worse?  
|                                      | Is the pain associated with other symptoms?  
|                                      | Do bowel movements make the pain better or worse?  
| Itching/burning                      | When did the problem start?  
|                                      | How long has it been going on?  
|                                      | Consistency of bowel movements?  
|                                      | Association with bowel movements?  
|                                      | Do you use soap directly on the anus?  
|                                      | Do you scratch on or around the anus?  
|                                      | Do you sense seepage or moisture around the anus?  
| Protrusion/prolapse                  | When was this first noticed?  
|                                      | Frequency and duration?  
|                                      | Association with bowel movements?  
|                                      | How much tissue protrudes?  
|                                      | Does it spontaneously reduce?  
|                                      | Do you have to manually push the tissue back in?  
|                                      | Has the protrusion ever become stuck?  
|                                      | Is the protrusion from the rectum, vagina, or both?  
|                                      | Does the protrusion seem to block or disrupt bowel movements?  
| Bowel movements                      | How often do you typically have a bowel movement?  
|                                      | What is the consistency of the bowel movement?  
|                                      | Do the bowel movements vary much in frequency and consistency?  
|                                      | Has there been a change in your normal pattern of bowel movements?  
|                                      | Do you have to push on the perineum or vagina to have a bowel movement?  
|                                      | Do you use fiber supplements, laxatives, or enemas?  
|                                      | Are your bowel movements difficult?  
|                                      | Are your bowel movements painful?  
|                                      | Do you have bleeding with your bowel movements?  
| Dietary history                      | Do dairy foods make symptoms worse?  
|                                      | Do wheat products make the symptoms worse?  
|                                      | Do any particular foods make the symptoms worse?  
|                                      | How much fluid do you drink in a typical day? What kinds?  

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bowel movements is important to determine. Significant pain with bowel movements that then recedes is almost always an anal fissure. Both anal abscesses and thrombosed hemorrhoids may worsen slightly with bowel movements but usually manifest with a constant pain that does not change with a bowel movement. Pain due to levator spasm is usually made better with bowel movements. Other clues that may be obtained from the history are that thrombosed external hemorrhoids (TEH) usually start with a lump that becomes progressively more painful, whereas anal abscesses usually start with pain and swelling occurs later. Anal fissures usually start after a hard or explosive bowel movement, whereas levator spasm starts after prolonged sitting in a patient who is experiencing increased life stress. Simple anorectal inspection and palpation is usually all that is required to confirm the diagnosis in a patient with anorectal pain. A TEH is usually a prominent, tender, discrete, hard, bluish swelling. A perianal abscess is usually indurated, erythematous, and more diffusely tender and may be associated with a draining fistula opening. Occasionally a deep anorectal abscess may only be palpable on digital rectal examination. An anal fissure is often associated with a contracted “tiny looking” anus that is in spasm. An associated midline sentinel skin tag may also be present. Anal fissures are most easily seen by gently spreading the perianal tissues in the anterior and posterior midline. Associated sentinel skin tags are caused by chronic inflammation and should easily be differentiated from hemorrhoids since they are almost always in the anterior or posterior midline, whereas hemorrhoids are typically found more laterally in the classic left lateral, right anterior, and right posterior quadrants. The anus appears normal in a patient with levator spasm, and in this case the diagnosis is made on digital rectal examination by palpation of the tender, tight levator muscles.

**Itching.** The differential diagnosis for itching includes pruritis ani, pinworms, dermatoses (eg, lichen sclerosis et atrophicus), Bowen’s or Paget’s disease, and anal warts. Perianal itching and burning (pruritis ani) is usually an indication of repeated irritation or trauma. Any condition that brings repeated moisture onto the perianal tissues may be at fault. Often it is the patient himself who is unwittingly causing or worsening the problem, since most patients with anal discomfort overclean the tissues with soap and frequent scrubbing. Often all that is necessary to help patients with pruritis ani is to treat underlying conditions and break the vicious cycle. If this can be done, the perianal tissues usually restore themselves to health.

One simple treatment algorithm is to first treat underlying conditions such as hemorrhoids, fissures, or dermatologic conditions. Second,
normalize the bowel pattern with fiber and fluid adjustment. Third, the patient must stop using soap, medicated wipes, or other irritants on the anus. Hydrocortisone cream (1%) can be applied sparingly 2 to 3 times daily, and cornstarch can be dusted on the perianal tissue to help absorb moisture.

**Prolapse.** The differential diagnosis for prolapse includes internal or external hemorrhoids, rectal prolapse, and hypertrophic anal papilla. A thorough history will help determine the diagnosis and treatment. Painless prolapse that reduces spontaneously and is associated with bright red bleeding is usually second-degree hemorrhoids and should be treated appropriately in the office. Irreducible prolapse is likely either grade 4 hemorrhoids or procidentia, both of which will require operation. Prolapse of a hard fleshy lesion not associated with bleeding is usually a hypertrophic anal papilla that can be treated with excision. Any prolapsing tissue will mandate direct visualization to rule out neoplasia, via anoscopy, sigmoidoscopy, or colonoscopy.

**Hemorrhoids**

“Hemorrhoids” are a normal feature of the human anorectum. This term refers to the normal submucosal vascular beds that are located circumferentially above and below the anal canal and contain not only blood vessels but smooth muscle and supportive connective tissue. The presence of hemorrhoids alone does not constitute disease. “Hemorrhoidal disease” requires the presence of pathologic changes that lead to bleeding, prolapse, thrombosis, or a combination thereof.

Although there are estimates that symptomatic hemorrhoids occur in up to 80% of the United States population, the term “hemorrhoids” is so frequently misused by patients to describe other anorectal problems, the actual prevalence is much less. Although men and women are equally affected, men are more likely to seek treatment. The prevalence of hemorrhoids increases with age until the seventh decade, at which point there seems to be a slight decrease. Pregnancy is also a predisposing risk factor for the development of symptomatic hemorrhoids.

**Anatomic and Pathophysiologic Features**

Hemorrhoidal cushions are classically described as appearing in the right anterior, right posterior, and left lateral positions (although intervening secondary hemorrhoidal complexes can be encountered). External hemorrhoids arise from the inferior hemorrhoidal plexus and are covered by modified squamous epithelium outside the anal verge. Internal hemorrhoids originate from the superior hemorrhoidal plexus and are
covered with mucosa, proximal to the dentate line. Internal hemorrhoids do not have somatic sensory innervation; in contrast, external hemorrhoids are exceedingly sensitive. The lining of the anal canal has the ability to sense temperature, vibration, noxious stimuli, stretch, and most importantly to differentiate among gas, liquid, and solid matter, but not pain.5

Although the exact pathogenesis of the development of symptomatic hemorrhoids may not be clear, symptomatic hemorrhoids are more frequently identified in patients with conditions causing increased straining and increased abdominal pressure.6 Chronic and increased straining disrupts the supporting smooth muscle and connective tissue (mucosal suspensory ligament), resulting in distal displacement and engorgement of the vascular bundles.7 A family history of hemorrhoids likely reflects a bias toward seeking treatment as opposed to a true increased incidence8 There is no evidence that prolonged sitting or heavy lifting causes hemorrhoids, although they could certainly aggravate preexisting hemorrhoids. Finally, rectal varices (in the patient with portal hypertension) are not hemorrhoids.

**Presentation/Evaluation**

Rectal bleeding is the most common manifestation of hemorrhoidal disease. Typically, the bleeding is bright red on the tissue paper, stool, or dripping in the toilet bowl. If prolapse is the major symptom, a mass may be appreciated protruding through the anal canal with defecation. Although this may initially reduce spontaneously after a bowel movement, over time this prolapse will result in persistent mucoid discharge and perianal irritation. Prolapsing hemorrhoids may also cause bloody staining or frank bleeding onto underclothing as well as lead to symptoms of minor fecal incontinence. This is particularly germane in the elderly population in which decreased sphincter tone also contributes to fecal staining and discharge.

Hemorrhoidal symptoms may be a manifestation of several different medical conditions, and therefore a careful evaluation of the patient should be conducted to determine the underlying causes of the patient’s complaints. A history should include not only a characterization of pain, bleeding, protrusion, and bowel patterns, but also an assessment of the patient’s coagulation history, the possibility of immunosuppression, and the rare need for antibiotics for prophylaxis. A complete examination including anoscopy, rigid/flexible sigmoidoscopy, and, if indicated, colonoscopy, should be performed before the selection of treatment. One must entertain the appropriate spectrum of differential diagnoses when a
patient presents with hemorrhoidal symptoms. This list should include colonic and rectal tumors (benign or malignant), abscess/fistula disease, anal fissures, inflammatory bowel disease (particularly Crohn’s disease), rectal prolapse, perianal condyloma, other sexually transmitted diseases, and hidradenitis suppurativa.

**Classification of Internal Hemorrhoids**

Internal hemorrhoids are classified as to the degree of bleeding and prolapse described by the patient or observed by the physician. First-degree internal hemorrhoids do not descend below the dentate line on straining and typically manifest as painless bright red rectal bleeding. Second-degree hemorrhoids protrude below the dentate line on straining and can be seen at the anal verge, but reduce spontaneously with cessation of straining. This often manifests as a mild discomfort and bleeding. Third-degree internal hemorrhoids protrude beyond the anal verge with straining and require manual reduction to return to the anal canal. This typically manifests as bleeding, mucous discharge, and sometimes pain. Finally, fourth-degree internal hemorrhoids lie permanently beyond the anal verge and return to the outside once they have been reduced manually. Pain, bleeding, possible thrombosis, and strangulation are often experienced in this situation.

**Treatment**

**Thrombosed External Hemorrhoids.** TEH can cause anywhere from minimal discomfort to severe, debilitating perianal pain. In these instances, an edematous, bluish, sometimes multiloculated firm mass is encountered. Therapy should be guided by the severity and duration of symptoms. Sitz baths, rest, bulking agents and/or stool softeners, and oral noncodeine analgesia are usually sufficient. However, prompt surgical excision can shorten the length of recovery and is recommended based on symptoms and duration of pain. If pain does not lessen within 72 hours or is severe at any time, excision can be performed in the office or in an emergency room. The affected area should be anesthetized with a local anesthetic containing epinephrine, pursuant to which an elliptical piece of overlying skin and the associated thromboses are excised, leaving the skin open. Incision of the skin overlying the thrombosis and clot evacuation is inadequate therapy and should not be entertained.

**External Hemorrhoidal Skin Tags.** Generally speaking, patients are discouraged from having their anal tags excised unless they interfere with anal hygiene. If the patient has any other symptoms associated with external hemorrhoidal tags, another process must be suspected. This is
particularly germane in the face of Crohn’s disease, where there is a risk creating an indolent, nonhealing wound. If a patient insists on excision, this can be performed under a local anesthetic in the office, using either a scissors or electrocautery. The procedural instructions mirror those given for a thrombosed external hemorrhoid excision.

Internal Hemorrhoids

More than 90% of patients with symptomatic internal hemorrhoids can be treated with conservative nonsurgical measures, and operation should be reserved only for the most severe cases. Patients who present with minor or infrequent symptoms corresponding to first- or second-degree internal hemorrhoids are properly treated with dietary modifications (ie, a high-fiber diet), bulking agents, and topical hydrocortisone-based creams. Although there are no data to support the use of topical creams often containing hydrocortisone, many patients do report a benefit from their use. Application of topical cream using a finger cot within the anal canal is preferable to inserted suppositories.

Patients who fail conservative medical treatment should be considered for conservative nonsurgical measures aimed at ablation of the vessels involved, since the major manifestation of the condition is bleeding. There is usually, however, an element of secondary mucosal fixation associated with these techniques. The most commonly employed methods include injection sclerotherapy, rubber band ligation, and infrared photo-coagulation.

Sclerotherapy. Mitchell first described using a mixture of phenol in olive oil to produce scarification and fixation of the mucosa and submucosa in 1871. Solutions used today include 5% phenol in almond oil, 5% quinine and urea, sodium tetradecyl sulfate, and 5% sodium morrhuate (my preference). This is performed in an office setting using a 25- or 30-gauge needle allowing for an injection of 1 to 2 mL of the sclerosant into the submucosal space. Sclerotherapy can be quite successful in the treatment of first-degree and small second-degree internal hemorrhoids, which are too small to treat with rubber band ligation.

Rubber Band Ligation. Blaisdell first described ligation of internal hemorrhoids in 1958, but it was Barrons’ modification using rubber bands first reported in 1963 that is the basis of present-day ligation. Numerous authors have documented the efficacy of rubber band ligation (RBL) in the treatment of the majority of patients with second- and third-degree internal hemorrhoids. A meta-analysis by MacRae and McLeod concluded that RBL and infrared coagulation (IRC) were both more effective than sclerotherapy. Since patients treated with IRC were more
likely to require repeat treatments, although RBL was more painful, RBL was recommended as optimal therapy. RBL is likely performed more than any other form of treatment for hemorrhoids. We prefer single ligations at 3- to 4-week intervals, allowing for an opportunity for the ulcer to heal and reduce discomfort. It is possible to shorten the duration of treatment by ligating all symptomatic hemorrhoids at the initial visit; however, this is at the expense of greater postprocedural pain. Banding techniques appear to achieve complete relief of symptoms in approximately 80% of patients.

**Infrared Coagulation.** IRC was first described in 1979 by Neiger for the treatment of internal hemorrhoids. This technique employs a tungsten halogen lamp that generates heat energy, generally for a 1.5-second period of time, resulting in destruction of the mucosa and submucosa at the application site. The depth of injury of this modality is usually 3 mm. Leicester and colleagues compared IRC and RBL in the treatment of first- and second-degree hemorrhoids, finding that IRC was more effective for first-degree hemorrhoids and equally as effective in second-degree hemorrhoids.

Other variations of the use of energy to destroy internal hemorrhoids include neodymium:YAG and CO₂ lasers, bipolar probe coagulation (Circon ACM1, Stamford, CT), and direct current therapy (Ultroid, Microvasive, Watertown, MA). None of these modalities are as widely used, or have the demonstrated effectiveness, as the previously mentioned techniques.

**Excisional Hemorrhoidectomy.** Hemorrhoidectomy is one of the oldest operations described. Hippocrates described a hemorrhoidectomy using cautery as early as 5000 B.C. Although practice parameters are established, the ultimate judgment regarding surgery must be made by the surgeon in light of the patient’s complete clinical presentation. A surgical hemorrhoidectomy is intended to restore the anal canal to normal or near normal function and anatomic status. Over time, several different techniques of hemorrhoidectomy have been described. None of them, however, has become accepted as the gold standard. The surgical principles include the elimination of the prolapsing vascular cushions alone or in combination with relocation of the squamous epithelium, thereby reconstructing the anal canal. Until the mid-1950s, the Milligan-Morgan hemorrhoidectomy using scissors resection was the most widely performed surgical procedure for this condition throughout the world. This procedure was relatively simple and easily taught. Although a well-performed operation provided excellent results, it was considered quite painful. Sir Allan Parks, in 1956, described a submucosal
hemorrhoidectomy that reconstructed the anal canal and therefore was expected to preserve better sensory continence and to reduce postoperative pain. In 1959, Ferguson and Heaton described the closed hemorrhoidectomy technique, which has become known as the Ferguson technique. As opposed to the United Kingdom, more members of the American Society of Colon and Rectal Surgeons report using a closed rather than an open technique when performing a surgical hemorrhoidectomy.

The open and closed techniques have their proponents and detractors. Roe and colleagues could demonstrate no difference in postoperative pain between a submucosal and a ligation excision hemorrhoidectomy. Although the submucosal hemorrhoidectomy preserved anal sensation better, this was not reflected in improved function. Hosch and colleagues recently reported a randomized prospective study comparing the Parks and Milligan-Morgan hemorrhoidectomy in which the former procedure was preferred on the basis of minimized postoperative discomfort, reduced hospital stay, and a shortened time for return to work. Diathermy hemorrhoidectomy has been advocated as an alternative to the traditional scissor dissection. It has been reported that blood loss and postoperative pain are less using this technique. Andrews and colleagues found that diathermy hemorrhoidectomy offered no significant advantage over the scissor-dissection classical Milligan-Morgan hemorrhoidectomy. On the other hand, in a larger randomized trial, Seow-Choen and colleagues reported that diathermy excision of hemorrhoids was faster than scissor dissection, involved less bleeding, and resulted in a significant reduction in the requirement for oral analgesia postoperatively. In a randomized prospective trial of open and closed hemorrhoidectomies, both using diathermy for dissection, Ho and colleagues reported faster and more reliable wound healing with the open technique. Our preference is an “open” diathermy hemorrhoidectomy.

New technology continues to be applied in a never-ending search for decreased postoperative pain and improved wound healing. Senagore and colleagues in 1993 reported the results of a randomized control trial using neodymium laser and cold scalpel to perform the closed Ferguson hemorrhoidectomy. Laser offered no advantage and in fact resulted in delayed wound healing, increased pain, and increased cost. Newer energy sources such as the harmonic scalpel and Ligasure (U.S. Surgical, Norwalk, CT) have also been touted by some authors but have not been fully evaluated. Controlled trials are mandatory to evaluate these modalities because of the potential added cost.
**Circular Stapled Hemorrhoidectomy/Procedure for Prolapsed Hemorrhoids.** The most dramatic change in excisional hemorrhoid surgery may be the use of a circular stapling device to reattach prolapsing mucosa and vascular cushions while excising any redundant distal rectal mucosa. This concept was originally presented by Peck and involved the application of 2 circumferential pursestring sutures and the subsequent firing of a circular stapling device. This is somewhat different from the modification that has been performed and reported by Longo and Milito and colleagues. Although several different names are applied to the procedure (circular stapled hemorrhoidectomy [CSH], procedure for prolapsed hemorrhoids [PPH], and stapled anopexy), this technique involves transanal placement of a circular pursestring suture located 4 cm above the dentate line. A 33-mm stapling device is placed transanally, facilitating circumferential excision of the distal rectal mucosa and sometimes a portion of hemorrhoid tissue with repositioning and fixation of internal hemorrhoidal tissue and anoderm (Fig 1).

Suture ligation of the vascular pedicles at the staple line has also been added to the original description. Initial results appear promising, with shorter periods of convalescence and similar complication rates compared with other forms of hemorrhoidectomy, but objective comparison has been difficult. Although many prospective studies have accumulated in Europe and the Middle East, there has been no good standard classification system used to guarantee that all patients entered into trials had had the same extent of hemorrhoidal disease.

Only 3 single-center randomized trials of the circular stapled hemorrhoidectomy have been published. Mehigan and colleagues reported a randomized control trial of 20 patients comparing the Milligan-Morgan hemorrhoidectomy with the CSH. They found equivalent operative times, lengths of stay, complications, symptom control, and short-term functional outcome for both groups. They recommended a longer term follow-up to fully evaluate the technique. Rowsell and colleagues reached the same conclusion with a smaller randomized trial of 22 patients, again with a short follow-up. The largest randomized controlled trial to date was conducted by Ho and colleagues in Singapore. One hundred nineteen patients were randomized to the Milligan-Morgan hemorrhoidectomy or the CSH for third-degree and fourth-degree hemorrhoids. Operative time, length of hospital stay, sphincter injury, and postoperative incontinence were equivalent. Postoperative pain, bleeding, narcotic use, healing, and return to work was much better in the stapled arm. However, the cost was 30% higher with the circular stapling device.
FIG 1. Circular stapled hemorrhoidectomy.\textsuperscript{33}
Although the technique is moderately simple, there have been reports of disturbing complications including rectal perforation and pelvic sepsis.\textsuperscript{37-39} Cheetham and colleagues\textsuperscript{40} reported a significant incidence of persistent pain and fecal urgency after a stapled hemorrhoidectomy. This undoubtedly results from distal placement of the staple line. A CSH is contraindicated if the patient has either an anal stenosis or fixed external hemorrhoid.

Finally, Singer and colleagues\textsuperscript{41} recently presented intermediate-term results of a multicenter prospective randomized clinical trial comparing the PPH with the Ferguson hemorrhoidectomy. With 80 patients completing at least a 6-month follow-up, the data suggest the superior performance of the PPH compared with the Ferguson hemorrhoidectomy with a lower frequency of new hemorrhoidal symptoms, similar need for other anorectal procedures, and the low risk of skin tag-related complications. These investigators feel that the durability of the PPH coupled with its early advantages of less pain and fast recovery are compelling reasons for wider application of the procedure.
Anesthesia. Although an excisional hemorrhoidectomy of any type can be performed under a general, spinal, or caudal anesthetic, our preference is intravenous sedation and local anesthesia. Regardless of the type of anesthesia chosen, a local agent such as $\frac{1}{4}$% bupivacaine with epinephrine to promote hemostasis and prolong the duration of anesthesia for postoperative pain management should be administered in all cases.

Special Circumstances. In the circumstance in which the patient has additional anorectal conditions, the appropriate surgical technique is applied. In the case of an anal fissure, a lateral internal sphincterotomy is performed. In the case of an anal fistula, a fistulotomy is performed. A transanal rectocele repair can also be incorporated with an excisional hemorrhoidectomy.

A hemorrhoidal crisis consists of acutely incapacitating prolapsed, thrombosed, and strangulated hemorrhoids involved in 1, 2, or all 3 primary complexes. Excisional hemorrhoidectomy, open or closed, can be employed safely in the same fashion as one would normally undertake. An important point to remember is that after injection of a local anesthetic with epinephrine, gentle pressure steadily applied to the hemorrhoid masses for 5 minutes results in considerable shrinkage of the tissue, allowing for reduction of the prolapse back into the anal canal. This will permit a more accurate assessment of the amount of tissue in the anoderm which can be removed.

The same technique is used for human immunodeficiency virus (HIV)-positive patients. Hewitt and colleagues\(^4^2\) reported there is no significant difference in wound healing for wounds that are left open or closed or between patients who have 1-, 2-, or 3-quadrant hemorrhoidectomies performed, regardless of the HIV status. There is no difference in overall complication rates between HIV-positive and HIV-negative patients.

In the rare circumstances in which the patient is pregnant, especially when she is in the third trimester, the left lateral decubitus position described by Ferguson and Heaton\(^2^1\) allows for comfort of the patient, appropriate fetal monitoring, and satisfactory exposure.

Posthemorrhoidectomy Complications

Although pain is not technically a postoperative complication, it is clearly the single most prevalent reason that individuals avoid hemorrhoidectomy. It is evident from various studies that the pain experienced after hemorrhoidectomy is extremely patient dependent. Since reflex spasm of the internal sphincter has been felt to be the main cause of postoperative pain, several variations of the hemorrhoidectomy have been reported. There are no studies, however, that clearly demonstrate the
utility of anal dilation or internal anal sphincterotomy concomitant with hemorrhoidectomy unless the patient also has a fissure. The most effective method to manage postoperative hemorrhoidectomy pain is the frequent administration of analgesia, with a combination of nonsteroidal antiinflammatory drugs (NSAIDs) and narcotic preparations administered in adequate doses. This is where the PPH seems to offer a clear advantage.

**Early Complications.** Postoperative complications after different types of excisional hemorrhoidectomy are comparable. Complications occurring within the first 1 to 2 days postoperatively include urinary retention, bleeding, soft fecal impaction, and itching. Urinary retention is rare and minimized by the use of intravenous sedation with a local anesthetic and restriction of perioperative fluids. Despite a well-performed surgical procedure, a finite number of patients (1%) will experience significant bleeding in the 30-day immediate postoperative period. Although perianal itching is often the result of drainage from the operative wounds, one should be alert to the not infrequent overzealous use of Vaseline and other ointments by the patient.

**Late Complications.** Late complications include urinary tract infection following catheterization, recurrent fecal impaction, secondary bleeding, superficial wound infection, anal stenosis, skin tags, anal fissure, and incontinence. The incidence of secondary hemorrhage after a Milligan-Morgan procedure approximates 1.5%. Open hemorrhoidectomies leave wide external wounds and superficial wound infections and abscesses are uncommon. In a more chronic situation, skin tags are rarely painful and can usually be treated in the office. This complication has been reported to occur in up to 4% of the patients after excision ligation. Roe and colleagueus found that although 50% of the patients may complain of soiling in the early postoperative period, all minor disturbances of continence had resolved in all patients by 6 weeks.

**Our Approach**

In patients who fail conservative medical treatment for bleeding, first-degree hemorrhoids are treated with sclerotherapy using 5% sodium morrhuate. The same therapy is used for small second-degree internal hemorrhoids that are not amenable to RBL. Our preference for second-degree and third-degree internal hemorrhoids is RBL. Patients who are anticoagulated who are treated with nonexcisional hemorrhoidectomy are routinely treated with a combination of RBL and sclerotherapy. The patients with a large external component to their condition are offered excisional hemorrhoidectomy (“open” diathermy technique). Patients

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with significant anatomic distortion (ie, associated rectal mucosal prolapse) are offered a CSH.

**Anal Fissure**

An anal fissure is a painful linear ulcer situated in the anal canal and extending from just below the dentate line to the margin of the anus. It is a very common problem, which causes severe pain out of proportion to the size of the lesion. Usually encountered in young and middle age adults, it has no gender predilection. In both men and women, fissures are more commonly found in the midline posteriorly; anterior fissures may be encountered in women (up to 15%) but are rare in men (1%).

**Etiologic and Pathologic Features**

The etiology of anal fissure is multifactorial and not completely understood. For the most part, it is agreed that trauma of the anal canal represents the initial insult. Hard bowel movements are the most common antecedent, but diarrhea may also be associated with the onset of fissure symptoms. Other risk factors include Crohn’s disease, previous anal surgery that may have produced scarring, and childbirth trauma. Fissures are very rarely seen in association with infections including tuberculosis, syphilis, HIV, and herpes.

Acute anal fissures have sharply demarcated, fresh mucosal edges and granulation tissue at the base. The majority of acute anal fissures heal spontaneously or with conservative treatment. Some lesions do not improve after 6 weeks and develop secondary changes characteristic of chronic fissures. The skin on the distal end of the fissure becomes fibrotic and edematous, forming a sentinel pile. The edges are fibrotic as well, and the internal sphincter fibers can be seen in the base.

Over the last decade, the focus of investigation has been on what causes fissures to persist and become chronic. Anal hypertonicity and subsequent decreased blood flow to the anoderm are now recognized as pivotal factors in the pathogenesis of anal fissures. The pressure of the anal canal is largely dependent on the internal sphincter. Several studies have demonstrated the basal and contraction pressures of the internal sphincter to be significantly higher in patients with fissures when compared with healthy controls.

By means of angiographic evaluation and dissection of the inferior rectal arteries in cadavers, it has been demonstrated that the posterior midline is the most poorly perfused area of the anal canal. The increased internal sphincter pressure in patients with fissures reduces the blood flow to this area even further. Sphincterotomy reduces the anal canal pressure
and improves anodermal blood flow at the posterior midline, resulting in fissure healing, which provides further evidence that abnormal activity in the sphincter contributes to the development of a fissure.\textsuperscript{50-53}

**Clinical Features**

The history is so characteristic that it is nearly diagnostic. Patients describe intense stabbing or burning pain initiated by the passage of stool. The discomfort may last for a few minutes or persist for several hours after defecation. Bleeding is common; the blood is bright red, scant, and separate from the stool. They may notice a sentinel pile, which is tender to palpation, and pruritis ani is occasionally an accompanying symptom. Often, patients relate a long history of constipation and straining or remember a particular episode of hard stools as the beginning of their painful ailment. On examination most fissures are visible by separating the buttocks. A sentinel tag may be the only sign to alert the examiner to the presence of the fissure. Most fissures can be seen and diagnosed on external inspection alone. Digital and endoscopic examination may not be possible if the patient has a markedly tender anus; with 5\% xylocaine cream, use of the little finger gently, and a pediatric sigmoidoscope, often more proximal disease can be ruled out. When the diagnosis is not clear, examination under anesthesia may be considered. This option should also be considered when the fissures are off-midline, when they are multiple, painless, or fail to heal.

**Medical Treatment**

Medical treatment is more likely to be effective in acute fissures. If the patient is constipated, a high fiber diet, increased water intake, and warm sitz baths may be all that is necessary. Although creams containing topical steroids and anesthetics such as pramoxine often have shown little benefit in clinical trials, many anecdotal reports support their use as first-line treatment, with many reports of healing in approximately 50\% of patients. Topical therapy with other pharmacologic agents is aimed at reducing internal sphincter tone. Nitric oxide donors (ie, glyceryl trinitrate and isosorbide dinitrate) were thought to aid in fissure healing by reducing intraanal pressure and by having a vasodilatory effect on the anal vessels. Recently, a large multicenter randomized trial demonstrated no benefit in healing of anal fissures with the use of nitroglycerine ointment when compared with placebo. Furthermore, studies that had shown that when there was initial healing of fissures after topical nitroglycerine treatment, high recurrence rates were demonstrated on long-term follow-up.\textsuperscript{54,55} Side effects of these topical preparations include burning sensation in the
anus, and between 19% and 58% of patients develop headaches that are significant enough to cease treatment.

Calcium channel blockers, specifically nifedipine and diltiazem, have been used as topical preparations for the treatment of this condition. Diltiazem was reported to have associated healing rates of up to 65%, but these results are hampered by side effects such as headaches and severe perianal dermatitis. Topical nifedipine has been shown to be effective in healing chronic anal fissures in up to 95% of patients treated in some studies, with fewer side effects than with diltiazem.\textsuperscript{56,57} Despite the initial good results, there are now some reports of recurrence as high as 42%.\textsuperscript{58}

Much attention has been given recently to botulinum toxin A (BTA) and its multiple new applications in medicine. BTA has been used in this instance to create a chemical denervation of the internal sphincter. Several studies report results after injection into the sphincter, with healing rates of 43% to 97%.\textsuperscript{59-64} Minguez and colleagues\textsuperscript{65} published the longest term follow-up to date (42 months) of patients treated with BTA and noted a recurrence rate of 42%. There has been no standardization of either the dose or the injection site in current studies. Transitory incontinence after injection as well as cases of hematoma, perianal thrombosis, infection, and sepsis have been described. In addition, concerns about the effects of BTA on the autonomic nervous system have been raised following isolated reports of severe heart and blood pressure problems.\textsuperscript{60,66,67} Further safety studies remain to be done and because of these issues, as well as the significant expense of the drug, the role of BTA in the treatment of patients with chronic fissures is still unclear.

**Surgical Treatment**

Although pharmacologic agents are employed as first-line treatment for patients with chronic fissures, failure of medical treatment warrants surgical intervention. Many procedures have been described, but the most popular and successful has been lateral internal sphincterotomy (LIS). Unlike the options described above, LIS is the only treatment that consistently heals and relieves the symptoms of chronic anal fissure in more than 98% of patients.\textsuperscript{46,68} Recurrence rates are also consistently lower, at 1% to 6%, than with other treatments. LIS is a very simple procedure that can be performed with local anesthesia in an outpatient setting with minimal postoperative morbidity. Reported postoperative complications, including bleeding, abscess formation, and fistula-in-ano, occur in fewer than 1% of cases. Reports of fecal incontinence after LIS vary significantly, but permanent disability is reported in most studies in fewer than 1% of patients.\textsuperscript{68-74} In our own practice, we have not seen an
instance of fecal incontinence after LIS despite having performed more than 4000 of these procedures.

Our Approach

After obtaining the standard history, external examination is performed, with an attempt to perform a gentle digital examination, and examination with a pediatric sigmoidoscope if possible, to identify proximal pathological conditions. Unless the patient has abnormal bowel movements, laxatives are not prescribed. Hydrocortisone cream 1% with pramoxine is prescribed, to be inserted into the anal canal 3 times daily with a finger covered with a finger cot, to deliver the cream to the proper area. Typically, conventional applicators and suppositories are not helpful. We see the patient again in 1 month, and if there is no significant improvement, the patient is offered LIS.

Anorectal Abscess and Anal Fistula

Anorectal abscess and anal fistula represent the same disease process viewed at different times. The abscess is the acute manifestation, whereas the fistula represents the chronic condition. Anorectal abscess and fistula afflict patients of all ages, with a peak incidence in the third or fourth decade. Perianal abscesses are 2 to 3 times more common in men than women.\textsuperscript{75}

Anorectal Abscess

Anatomic and Physiologic Features. Understanding the anatomic features of the pelvic floor is critical in the diagnosis and treatment of abscess/fistula disease. The pelvic floor consists of 2 funnel-shaped structures, 1 inside the other. The inner tube is the lower end of the circular muscle of the rectum, which becomes thick and rounded as it becomes the internal sphincter. Surrounding this is the funnel of pelvic floor musculature consisting of the levator ani, puborectalis, and external sphincter. In between these 2 structures is the intersphincteric plane. The resulting 4 potential anorectal spaces are the perianal space, the ischiorectal space, the intersphincteric space, and the supraplevator space (Fig 2).\textsuperscript{76} Anal glands range in number from 4 to 10 and are concentrated in the posterior aspect of the anal canal. In the midanal canal the ducts of the anal glands empty into the anal crypts. The glands enter the submucosa; two thirds penetrate the internal sphincter with half of these traversing into the intersphincteric space. They do not extend into the external sphincter.\textsuperscript{77}
Ninety percent of abscesses result from nonspecific cryptoglandular suppuration. This theory was first described by Chiari in 1878, but more eloquently studied by Parks,78 suggesting that abscesses result from obstruction of the anal glands and ducts. Persistence of anal gland epithelium in part of the tract between the crypt and the blocked part of the duct leads to formation of a fistula. Although no specific cause can be found for the great majority of abscesses and fistulas, specific etiologic factors include inflammatory bowel disease (especially Crohn’s disease), infection (eg, tuberculosis, actinomycosis, and lymphogranuloma venereum), trauma (eg, impalement, foreign body, and surgery—anorectal, genitourinary, and gynecologic), malignancy (eg, carcinoma, leukemia, and lymphoma), radiation, anal fissure, and immunosuppression.

**Classification.** Abscesses are classified by their location in the potential anorectal spaces in the pelvis: perianal (most common), ischiorectal, intersphincteric, and supralever (least common) (Fig 2). The ability for infection to track circumferentially through the intersphincteric, ischiorectal, or supralever spaces can result in a horseshoe abscess.

**Clinical Presentation/Evaluation.** Pain, swelling, and sometimes fever are the classical symptoms of an abscess. In the case of a perianal abscess, the pus is dissecting inferiorly in the intersphincteric space to present at the anal verge as a tender, erythematos, fluctuant mass. An ischiorectal abscess results from the abscess traversing the external sphincter into the ischiorectal fossa. Because of the compressibility of the ischiorectal fat, these abscesses tend to be larger and often present less dramatic cutaneous findings. Severe rectal pain associated with urinary symptoms
may suggest either an intersphincteric or a supralevator abscess. In the case of the former, it does not require a large volume of pus to produce excruciating pain without any obvious external findings. It is often impossible to perform a thorough examination in this situation. Occasionally, a patient may complain of gluteal pain, which should make one consider a supralevator abscess. In this case, a tender mass may be palpated on rectal or vaginal examination. In this case, the abscess may be the result of a cephalad extension of an ischiorectal abscess, infection tracking from within the intersphincteric plane, or maybe the result of pelvic sepsis. Finally, the presence of a black spot should never be overlooked because this may be indicative of a widespread necrotizing infection.

Treatment. The treatment of an acute anorectal abscess is appropriate incision and drainage. Most perianal abscesses and many ischiorectal abscesses can be satisfactorily drained in the physician’s office using local anesthesia. The abscess should be drained as close to the anal verge as possible to make a subsequent fistulotomy shorter and simpler. It is imperative that the drainage wound stay open long enough for the abscess to completely drain the infection. This can be accomplished by excising an ellipse of skin or making a cruciate incision and excising the skin edges. Use of drains is usually not necessary with an adequate skin incision; packing is counterproductive.

Antibiotics are ineffective as the primary treatment of abscesses and are only indicated in instances in which a patient has 1) valvular or rheumatic heart disease, 2) diabetes, 3) immunosuppression, 4) extensive cellulitis, or 5) a prosthetic device. The use of antibiotics waiting for the abscess to point can result in extensive spread of the inflammatory process along tissue plains and result in sphincter damage. Life-threatening necrotizing infections and deaths have been reported because of delay in diagnosis and treatment of abscesses.

Drainage of larger abscesses, such as a “horseshoe abscess” extending on either side of the midline, requires regional or general anesthesia. Adequate drainage of the deep postanal space requires a radially placed posterior incision, with counter-incisions made over each ischiorectal fossa lateral to the sphincter mechanisms. These counter-incisions can be kept open with small Penrose drains encircling the skin bridges that have been created.

The origin of a supralevator abscess should be determined before drainage. If the origin is an intersphincteric abscess, drainage should be through the rectum and not through the ischiorectal fossa, as this would result in a suprasphincteric fistula. Along the same lines, if the source is
an ischiorectal abscess, it should be drained as such and not through the rectum, for this would result in the creation of an extrasphincteric fistula (Fig 3). Finally, if the abscess is from a pelvic process, it can be drained through the rectum, the ischiorectal fossa, or the abdominal wall, depending on the specific location, and computed tomographic (CT) assessment and percutaneous drainage may be considered. Postoperatively, patients are advised to eat a regular diet, sitz bathe 3 times per day, take a bulking agent of some sort, and they are routinely given oral analgesics that do not contain codeine.

For most patients, abscess drainage alone resolves the acute problem, and sequelae do not develop. Recurrent abscesses or anal fistula may develop in 37% to 50% of patients. The recurrent process is much more common when treating patients with ischiorectal abscesses than those with perianal abscesses. On the other hand, primary fistulotomy at the time of abscess drainage has been found to decrease the rate of recurrent abscess and fistula to 1.8%. The surgeon should balance the benefit of a single operation, albeit with a large draining wound, as opposed to a second operation with a more defined and smaller fistula tract.

**Anorectal Fistula**

**Anatomic and Physiologic Features.** A fistula is defined as an abnormal communication between any two epithelium-lined surfaces. An
anorectal fistula is an abnormal tract communicating with the rectum or anal canal by an identifiable opening. The classification of fistulae as described by Parks and colleagues\textsuperscript{84} is the most complete. An intersphincteric fistula results from a perianal abscess that has tracked within the intersphincteric plane. This accounts for 70% of fistulae.\textsuperscript{82} A transphincteric fistula results from an ischiorectal abscess, in which case the tract passes from the primary opening across both sphincters into the ischiorectal fossa. Twenty-three percent of fistulae represent this group. A suprasphincteric fistula occurs approximately 5% of the time and results from a supralelevator abscess. In this case, the tract originates at the dentate line, extends in a cephalad direction above the puborectalis and then proceeds distally lateral to the external sphincter to the perianal skin. Extrasphincteric fistulae account for only 2% of fistulae (Fig 4). The tract passes from the rectum above the levator ani traversing them and proceeding through the ischiorectal fossa to the perianal skin. This fistula can be the result of trauma, diverticulitis, Crohn’s disease, or cancer or its

\textbf{FIG 4.} Types of anorectal abscesses: intersphincteric (A); transphincteric (B); suprasphincteric (C); and extrasphincteric (D).\textsuperscript{79}
treatment. Unfortunately, the most common cause is iatrogenic from overzealous probing during fistulotomy surgery.\textsuperscript{85}

\textbf{Clinical Presentation/Evaluation.} Patients will often recall an abscess that either drained spontaneously or was surgically drained. Common complaints include intermittent bloody and purulent discharge, pain with defecation, and decrease in pain whenever discharge increases. On examination, an external opening can almost always be identified by granulation heaped up around it or by the discharge of pus. Often, however, the internal opening cannot be found due to swelling in the sphincter mechanism. Goodsall’s rule predicts that fistulae with an external opening posterior to a transverse line drawn through the anal canal have their crypt of origin in the posterior midline. Conversely, fistulae with external openings anterior to this transverse plain tend to have a radially oriented fistula tract. Also, if the secondary opening is more than 3 cm from the anal verge, the probability of a complicated cephalad extension is greater (Fig 5).

Often, the fistula tract can be palpated as a cord leading to the sphincter mechanism. Frequently, a dimple associated with the crypt of origin is seen on digital rectal examination. Probing in the office is generally very uncomfortable for the patient, and adds little to the ultimate treatment.
plan. Complete gastrointestinal evaluation is indicated in patients with symptoms of inflammatory bowel disease or patients with multiple or recurrent fistulæ.

Fistulography is often unreliable\(^8^6\) but should be considered in the management of recurrent or complex fistulæ or in Crohn’s disease, where there is often severely distorted anatomy.\(^8^7\) Transanal ultrasound with or without hydrogen peroxide injected into the tract may be helpful in identifying complex fistulæ. Endoluminal magnetic resonance imaging (MRI) may be quite helpful when available. When compared with ultrasound without hydrogen peroxide, MRI was more accurate in classifying anorectal fistulæ (61% vs 89%).\(^8^8\)

**Treatment.** The goal of fistula surgery is to eliminate the fistula, prevent recurrent disease, and preserve sphincter function. This requires the identification of the primary opening and limiting the amount of muscle division. Ideally, the internal opening can be identified with the aid of a crypt hook or the use of 1 or more probes gently passed in an antegrade or retrograde fashion. Injection of dilute methylene blue, milk, or hydrogen peroxide has also been described. It is possible to follow the granulation tissue in the tract from the secondary opening to the primary opening. Lateral traction on the fistula tract sometimes will result in dimpling at the primary opening.\(^8^2,8^9\)

The treatment of simple intersphincteric or transphincteric fistulæ is similar. Having identified the tract, the tissue overlying the fistula probe is incised, the granulation tissue is curetted from the wound, and gentle exploration of the tract for blind tracts or extensions is performed.

If the fistula tract traverses the sphincter mechanism proximal to the level of the dentate line, the use of a lay-open fistulotomy in conjunction with placement of a seton is a safer option. In this case, the lower portion of the internal sphincter as well as the overlying skin is divided to reach the secondary fistula opening, and a silk suture or vessel loop is inserted into the portion of the fistula tract above the dentate line. The seton will stimulate granulation tissue, which will reduce retraction of the sphincter mechanism at secondary fistulotomy. This should be considered in the presence of multiple fistulæ, anterior fistulæ in women, Crohn’s disease, previous sphincter injury, or impaired continence.

More complex fistulæ, such as a “horseshoe fistula,” which may track circumferentially around the outer border of the external sphincter, present additional problems of multiple external openings from the previous widely spread infection. The key to success involves identification of the primary opening in the posterior midline with adequate division of the appropriate portions of the internal and external sphincter...
posteriorly. Removal of the granulation tissue from the lateral tracts is achieved by a curettage rather than laying open the entire length of the tracts. Treatment of an extrasphincteric fistula depends on its cause. If the etiology is iatrogenic, the lower portion of the sphincter is divided and the rectal opening is closed. On occasion a temporary colostomy may be necessary. If the fistula results from a foreign body, it is removed, the internal opening is closed, drainage is established, and temporary fecal diversion is established. If a fistula results from a pelvic abscess, this abscess must be drained to anticipate healing of the fistula.

In patients with Crohn’s disease, the liberal use of setons to maintain satisfactory drainage and preserve continence is encouraged. That being said, a straightforward fistula with a well-defined primary opening can be treated safely via fistulotomy. It is not surprising that patients with no colorectal involvement report better results, however.\textsuperscript{90}

Recurrence after fistulotomy can result from failure to identify the offending crypt, inadequate identification and drainage of accessory tracts, premature superficial closure of the wound,\textsuperscript{81} or epithelialization of the tract.\textsuperscript{89} In rare cases, complicated pilonidal disease and hidradenitis should be considered as possible etiologies.

It is imperative that one has a reasonable assessment of the patient’s level of sphincter control before operation, so that the extent of sphincterotomy during fistula surgery can be considered. Since the puborectalis muscle is the primary muscle responsible for continence, and supports the posterior and lateral aspects of the upper anus, intersphincteric and transspincteric fistulas located posteriorly or laterally can generally be laid open if the internal opening is at the dentate line and if 50% or less of the height of the anal canal is divided. Anterior fistulas, especially in women, require additional considerations, and are more likely to be staged with setons.

Postoperative care for a lay-open procedure, with or without seton placement, consists of a regular diet with bulk agents and oral analgesia. Patients are advised to sitz bath 2 to 3 times per day, and are routinely seen in 3 weeks’ time. Healing generally takes 6 to 10 weeks, and the patient should be apprised of this before the procedure. Premature skin closure of the fistulotomy wound or excess granulation tissue are treated at that time. If there are no concerns about healing, the patient is seen again in 6 to 8 weeks; otherwise, he is seen sooner to address any wound issues.

If there is concern that fistulotomy may result in significant fecal incontinence, an endorectal flap should be considered. This is particularly germane for rectovaginal fistulae, high transspincteric, supraspincteric,
and complicated Crohn’s fistulae. The procedure involves identification of the primary opening, excision and closure of this opening, curettage and drainage of the tract, and an advancement flap involving mucosa, submucosa, and a superficial portion of the internal sphincter. It is imperative that the base of the flap be at least twice the width of the apex, and that it be secured distal to the primary opening (Fig 6).

The initial enthusiasm surrounding the use of fibrin glue to seal fistula tracts is fading. Although several commercial products are available and the technique is quite simple, initial success rates that approximated 65% are fading quickly with longer term follow-up. This procedure does, however, have the unique advantage of not compromising continence and may ultimately have a role in specific situations. In general, the longer the fistula, and the narrower the diameter of the tract, the greater is the likelihood of success with fibrin glue.

Pruritis Ani

Definition

Pruritis ani is a dermatologic condition characterized as an unpleasant itchy or burning sensation in the perianal region. Although pruritis ani can develop due to definable perianal dermatologic conditions, such as psoriasis or lichen sclerosis et atrophicus, most cases are idiopathic; contributing factors include vigorous perianal hygiene, loose stools, prolapsing hemorrhoids, and the frequent use of creams and ointments, all of which serve to cause excessive perianal wetness with maceration of the perianal skin. The pruritis can be classified by using the Washington Hospital Center criteria. Stage 1 skin is red and inflamed. Stage 2 consists of white lichenified skin. Stage 3 involves lichenified skin together with coarse ridges of skin and ulcerations.

Assessment

Assessment of the patient includes questioning the overzealous use of perianal hygiene, stool consistency, the amount of fluid in the diet (as a factor contributing to loose stools), or stool leakage. Although certain foods have been reported as being associated with pruritis, such as coffee, spicy foods, dairy products, and citrus fruits, it is likely that the real cause is the associated fluid consumption, rather than the dietary items themselves. The moisture from anal fissures, fistulas, or mucosal prolapse, and the subsequent attempts to deal with such fluid, can also be contributing factors. Neoplasms such as Bowen’s disease, Paget’s disease, and cloacogenic carcinoma can also all cause pruritis. Fungal or bacterial infections, or parasites such as pinworms, are very rare causes.

Numerous dermatologic conditions can affect the perianal region. Contact dermatitis from applied “therapies” such as topical anesthetics, lanolin, Neosporin, or even overuse of topical steroids. Other conditions such as psoriasis, lichen planus, seborrhea, and hormonal deficiency in menopausal women are also uncommon but specific causes of pruritis ani.

Most often, an initial sensation of pruritis becomes exacerbated by excess attention to the area by overcleansing with irritating soaps, excessive use of creams or ointments, or repeated scratching, which further damages the skin and increases the inflammation and symptoms.

Treatment

A patient who presents with pruritis ani should initially undergo a detailed history and physical with attention to the aforementioned potential etiologies. Although potential causative conditions should be
treated appropriately, the patient with idiopathic pruritis ani requires a complete discussion on ideal anal hygiene and reassurance. Irritants such as bar soap, vigorous scrubbing (either with a washcloth or with dry toilet paper), or inciting foods should be avoided. Air-drying the perianal region with a fan or hair dryer after showering is sometimes helpful, if difficult to accomplish. A thin wisp of cotton or application of cornstarch to the area can also alleviate the symptoms over time. A discontinuation of all previously tried ointments or creams should be encouraged to help establish the new approach and prevent excessive irritation of the area.

Reassurance that the irritation is not cancer and can be treated reasonably can go a long way to alleviate much of the focus and discomfort in the area. Clearly, however, any lesion that remains despite treatment in a reasonable amount of time should undergo further investigation with biopsy and dermatologic consultation.

**Condyloma Acuminata (Genital Warts)**

Genital warts received their medical name when Martial in the first century A.D. in Rome described them as condylomata (meaning "figs") acuminate (meaning "pointed"). These lesions have been said to represent the most commonly encountered venereal disease in surgical practice. A recent study checking seroprevalence of human papilloma virus (HPV) type 16 in the United States found that in the population aged 12 to 59 years the rate was 13.0%. Koutsky and colleagues estimate that 1% of sexually active adults have visible genital warts. Although anal condyloma are associated with anal receptive intercourse, the incidences range in this population from 46% to 95%, allowing for other modes of transmission.98

The causative agent for genital warts is HPV. At least 66 types of this virus have been identified, but only 12 have been isolated from the lesions in genital warts. The types 6, 11, 16, and 18 are most frequently found. The HPV 6 and 11 are associated with typical condylomata acuminata, whereas the HPV 16 and 18 are found more commonly with dysplasia and malignant transformation. Types 31, 33, 34, and 35 are also associated with more dysplastic lesions.

Patients with perianal condyloma may also harbor such lesions on the penis, vulva, vagina, cervix, and distal urethra. In 50% to 90% of perianal condyloma, the lesions also involve the anal canal and transitional epithelium of the distal rectum. Imunosuppression also plays a major role in the pathogenesis of these lesions. A strong correlation between anal HPV and HIV infection has been identified. HPV prevalence in
HIV-positive patients is known to increase with declining CD4 cell counts: 33% with counts greater than 750, 56% with counts from 200 to 750, and 86% with counts less than 200.102

Condylomata acuminatum vary from very small lesions to large cauliflower-like projections. Extremely large forms of this disease (Buschke-Lowenstein tumors or verrucous carcinoma) were initially described by Buschke and Lowenstein in 1925 on the penis.103 The symptoms of the warts vary from few symptoms at all, to bleeding with defecation and complaints of anal wetness.

**Diagnosis**

The clinical appearance of these lesions is often clearly diagnostic. Anoscopic examination should be performed to assess the anal canal and distal rectum. Rigid sigmoidoscopy is helpful to rule out associated sexually transmitted diseases of the rectum such as gonorrhea, herpes simplex, or infectious proctitis such as cytomegalovirus or giardia. HIV infection should also be considered in these patients.

Condyloma acuminatum are associated with dysplasia and epidermoid cancer, just as the HPV virus is associated with cervical dysplasia and cancer. Prasad and Abcarian reported that 1.8% of their 330 patients had anal condylomata that demonstrated malignant potential.104 The incidence of anal intraepithelial neoplasia (AIN) has also been studied, with an overall incidence found to be 35%. The relative risk of AIN with anal warts is increased from 1.0 to 4.70.105 The parallels of these lesions with cervical lesions has prompted some investigators to employ a perianal “pap” smear to screen anal regions. This metaplastic change to AIN and then squamous cell carcinoma has further been associated with these lesions.106

**Treatment**

In 1991, von Krogh105 outlined a reasonable approach to wart therapy: 1) induction of wart-free periods, 2) therapy no worse than the disease, and 3) minimization of mortality and morbidity from associated malignancy.

Many methods of treating condyloma acuminata have been employed. Topical methods with caustic or cytotoxic agents, cryotherapy, or herbal remedies have been used. Immunologic methods have been investigated, and the more invasive techniques such as electrocautery, laser, and surgical excision are also included in the armamentarium of the treating physician. Regardless of the method of treatment, recurrence is so
frequently encountered that it is very frustrating for patient and physician alike.

Topical administration of cytotoxic agents have overall met with mixed results. These treatments have the distinct advantage of being performed in the office with relative ease and minimal discomfort. Podophyllin is the best known and most traditional of the nonsurgical treatments. This agent has been used in a 5% to 50% concentration in an alcohol base, without much difference in efficacy. Although effective in a few cases, or with small warts, it has been associated with high recurrence rates (30% to 65%), systemic toxicity, and is potentially oncogenic.  

Bichloracetic acid and trichloroacetic acid are much more caustic and more effective for tiny warts (1-2 mm diameter), although more than one application may be required. These agents are better tolerated than podophyllin. Podophyllotoxin, also called podofilox, has also been employed with mixed success, similar to the previously described agents.  

5-Fluorouracil (5-FU) is an antimetabolite that acts in the S phase of the cell cycle. A mixture of this compound with salicylic acid (Solcoderm) is also available. Pareek described 41 men whose warts were treated with 5% 5-FU cream for 3 to 7 days, and reported complete regression in 35 to 41 days; however, the length of follow-up is not described.

Local applications of immunomodulators such as imiquimod (Aldara) have also been used with some success. This compound is a potent inducer of interferon-alfa and enhances cell-mediated cytologic activity against viral targets. Mild to moderate local inflammation is the most common side effect, but the drug is well tolerated in general.  

Some literature exists to support the use of autologous vaccines for the treatment of condyloma. The treatment requires manufacturing a vaccine and weekly injections for 6 weeks. The few studies on this subject report improved disease-free intervals and intermittent regression, although the mechanism is not understood. This method is, to our knowledge, no longer available, and is not currently FDA approved.  

Cryotherapy and laser therapy have also been employed as destructive techniques for condyloma. The various substances available for cryotherapy include liquid nitrogen and liquefied air. This form of destruction is relatively successful but requires storage of the compounds or special equipment to perform in the office setting. We have shown that the recurrence rate after both laser and cryotherapy is nearly twice that of those treated with simple electrical cautery, that pain is comparable among all of these alternatives, and the cost of using the laser is much greater than for electrocautery. Surgical techniques, although expensive and uncomfortable, remain the best choice initially for extensive
warts. Scissor excision and electrocautery both have their advocates and both have successful cure rates of 80% to 94%. These obviously can be employed in the office or in a day surgery setting.

Our Approach

In our office, the treatment of the patient with anal condyloma is based on the number and location of lesions. If only a few warts are seen in the perianal area, without significant wart burden inside the anus, and if lesions are less than 2 mm in size, we usually treat these with bi- or trichloroacetic acid, with office visits every 2 to 3 weeks for reapplication. Patients with more extensive lesions or intraanal lesions or those in whom there is concern for AIN are best treated in day surgery where excision and fulguration is performed. The larger specimens are sent for pathological evaluation. These patients are typically seen within 4 weeks of the initial visit, with subsequent destruction of any remaining lesions, either with chemical or electrical cautery in the office. These patients are again followed every 4 weeks until examination reveals a disease-free anal area. The frequency of follow-up depends on the rapidity with which new warts are appearing. After a few weeks to months, there is usually a noticeable drop in the number and size of new lesions, and patients should be seen only every 6 to 8 weeks. It is our policy to follow patients with regular appointments until 6 months has elapsed since the last wart was seen; once they reach this milestone, more than 95% of patients will be wart free (despite the fact that HPV itself is not eliminated from the body). Given the association with AIN and slightly higher risk of developing anal cancer, these patients are then seen once each year for reexaminations.

Neoplasms of the Perianal Skin and Anal Canal

Definitions

Neoplasms of the anus are divided into anal canal cancer, which accounts for 85% of cases, and perianal cancer (sometimes called “anal margin” cancer) accounting for the remaining 15%. These anatomic distinctions require an understanding of the histologic and anatomic landmarks of the anus. The anal canal extends from the anal verge to the rectum at the superior border of the levator muscle. Histologically, however, the dentate line, lying within the anal canal, is the delineator between the external squamous epithelium and the proximal columnar epithelium. The dentate line also identifies the most common lymphatic drainage of the areas, with lesions distal to the dentate line typically
draining via the inguinal pathway, and proximal lesions draining abdominally via the mesorectum and pelvic vessels.

**Anal Intraepithelial Neoplasia**

Anal intraepithelial neoplasia (AIN) is understood as the precursor dysplastic lesion for anal cancer. AIN is classified as AIN I (low-grade dysplasia) or AIN II or III (high-grade dysplasia). AIN III was formerly called “carcinoma in situ.” The risk factors associated with development of AIN and anal cancer are obscure, but links have been found with syphilis, herpes simplex virus type 2, HPV and condyloma acuminata, gonorrhea, chlamydia, and cigarette smoking.

It is believed that the natural progression of dysplasia is from low-grade to high-grade, with some transforming into invasive squamous cancer. However, many authorities feel that the majority of AIN III may remain unchanged for many years without malignant degeneration. AIN III of the perianal skin is called Bowen’s disease. The treatment of this condition involves histologic identification of the involved areas in the anal area. Visualization of the area with the use of anal colposcopy by using 3% to 5% acetic acid similar to the technique used for uterine cervix colposcopy, with mapping of the area, with multiple biopsies of all areas, is helpful to characterize the extent of involvement. Treatment of the areas with topical chemo-therapeutic agents remains to be proven effective. Surgical excision of highly dysplastic areas with close follow-up and surveillance every 2 to 4 months is recommended.

**Paget’s Disease**

Perianal Paget’s disease, which is “adenocarcinoma in situ” (in contrast to Bowen’s disease, which is “squamous cell carcinoma in situ”) starts out as a benign neoplasm but may eventually become invasive. This disease most commonly affects elderly people, with an average age of 66 years. The lesions appear as eczematous and erythematous lesions often causing pruritis. These lesions must be biopsied and mapped for pathologic diagnosis, and because of a high incidence of associated visceral malignancy (50%) these patients require a thorough evaluation. In noninvasive cases the lesions can be cured with wide local excision, whereas patients with progression of Paget’s disease to invasive lesions have considerably worse prognosis because of the potential for distant disease.
**Bowen’s Disease**

Squamous cell carcinoma can occur in the perianal skin or in the anal canal. The approach to these lesions differs. A perianal squamous cell carcinoma lesion behaves like those occurring in other skin bearing parts of the body, and local excision is frequently sufficient for cure. Unfortunately, these lesions are often discovered in an advanced stage, often measuring 5 cm or larger on presentation. In such situations, a combination of wide local excision may be supplemented with chemoradiation protocols.

**Anal Canal Cancer**

Squamous cell carcinoma of the anal canal accounts for the majority of tumors in the anal area. The microscopic appearance of this cancer ranges from transitional to keratinizing to basaloid. The term cloacogenic carcinoma has been used to describe the transitional or basaloid forms of this cancer. These tumors are often encountered late in their course, and lymph node metastases are encountered in 35% to 50% of patients with the basaloid type of squamous carcinoma.

The treatment of patients with these lesions depends on their size and depth of invasion. For early carcinomas that are confined to the submucosa, local excision is associated with 5-year survival rates that can be as high as 100% without recurrence, but this is uncommonly successful. For larger and deeper lesions, the results of surgical excision and abdominoperineal resection (APR) are poor, with local recurrence rates of 27% to 50%. In 1972 Nigro and colleagues designed a preoperative chemoradiation protocol in an attempt to downsize tumors in preparation for abdominoperineal resection. They administered 5-FU, mitomycin C, and 30 Gy of external beam irradiation and then performed APR. Five of the first 6 patients in their study had no histologic evidence of tumor in the operative specimen, so instead of radical surgery, these patients were closely followed, with 85% being rendered tumor-free by chemoradiation alone. Subsequent studies have shown similar success. The management of these patients after chemoradiation involves close inspection with judicious biopsies of the tumor scar to assess for remaining tumor.

Other rare anal canal cancers include adenocarcinoma and melanoma. Adenocarcinoma of the anal canal most often is an extension of very low rectal adenocarcinoma extending into the anal canal. Adenocarcinoma can also develop in the anal glands or in longstanding chronic fistulas. These cancers can be approached as an ultra-low rectal adenocarcinoma...
via transanal excision or APR. Anal melanoma accounts for 0.25% of all anorectal cancers, but its early metastatic nature makes it particularly difficult to treat. At the time of diagnosis these tumors measure between 2 to 5 cm, and they metastasize to lymph nodes early in their course. Melanomas tend to be radio- and chemo-resistant. Local excision is recommended when technically feasible because the prognosis is unchanged even with radical surgery. An APR may have some role in controlling loco-regional disease, but is not associated with improved survival.

**Our Approach**

The patient who presents to our clinic with AIN I to III will be treated initially with a perianal mapping to determine the extent of the disease. Topical chemotherapeutic agents such as 5-FU cream are initially used for low to moderate grade AIN with frequent reexaminations every 2 to 4 months. Any continually suspicious areas will be rebiopsied and locally excised. The patient with anal margin cancer is staged by CT and if the disease is truly localized, wide local excision is often sufficient to achieve a cure. Anal canal cancer is biopsied, the patient is staged with CT, and is referred for radiochemotherapy. Rebiopsy is performed 2 to 3 months after the completion of radiochemotherapy.

**Pilonidal Disease**

**Definition and Etiologic Features**

William Mayo published the first descriptions of pilonidal disease in 1833, but it was Hodges in 1880 who first used the term “pilonidal.” Pilonidal disease presented a significant problem to soldiers and surgeons alike in WWII when whole wards were dedicated to the care of thousands of these patients and their large, slow-to-heal wounds created by surgery to correct the problem. Military surgeons continue to encounter pilonidal disease with a great deal of regularity, presumably due to the conditions soldiers endure in the field over prolonged periods of time. Ultimately, as the pathophysiologic features of pilonidal disease became better understood, a paradigm shift occurred in the later part of the 20th century away from surgery as the first line treatment in favor of hygiene and hair shaving as initial therapy. Vacuum and pulling forces in the natal cleft are thought to draw hair into the follicles, which can then cause blockage of the follicles with the hair and keratin. Subsequent foreign body reaction, abscess, and rupture of the follicles begin the process whereby pilonidal sinus disease forms. The
first line of treatment is always incision and drainage of any abscesses present and routine wound care after that until healing is complete. The controversy lies in what to do next.

**Evolution of Surgical Treatment**

Multiple surgical treatment options for pilonidal disease are available, none of which have been shown to be completely definitive. The ideal treatment would be easy to perform, require short or no hospitalization, have a low recurrence rate, have minimal pain and wound care, have a fast return to normal activity, and be cost effective. To date no treatment, conservative or aggressive, meets all these criteria. In addition to midline excision the surgical options commonly used today, after initial shaving and hygiene methods have failed, include rhomboid flaps, Z-plasty, the Bascom procedure, the Karydakis procedure, V-Y plasty, skin grafting, and gluteus maximus myocutaneous flaps.

The primary impediment to deciding which approach to this problem should supercede all others is the paucity of level I evidence on the subject. The best evidence that is available seems to favor flap or asymmetric closure over simple excision in the midline, with or without primary closure of the wound. Long-term follow-up in all but a few studies is lacking. What follows is a brief review of the studies that met the criteria for a randomized, prospective study during a Medline search. In 1994 Armstrong and Barcia\(^{128}\) published their study on conservative treatment of pilonidal disease. This study has the largest number of patients of any randomized study of pilonidal disease to date. These investigators treated the conservative group with meticulous shaving and hair removal. The excisional group was not controlled for the type of operation performed. They then compared the number of occupied bed days and number of operations needed over 3 years in both groups. There was a highly significant difference in favor of conservative treatment. This study has been criticized, however, because of the outcome measures the investigators used. They did not report on healing or recurrence rates at all. The implication is that even though the conservatively treated patients did not occupy hospital days or receive an operation, they may still have been suffering from their pilonidal disease in one way or another. These patients may also have sought treatment somewhere else besides the authors’ institution. Despite these limitations this study provides the only and best evidence that conservative treatment, when applied with a dedicated effort, can be effective and should be considered as initial therapy in all patients.

Probably the most commonly performed operation for pilonidal disease...
is midline excision, with or without primary closure of the wound. However, only 4 randomized, prospective studies have been published that examine the results of this method. Fuzun and colleagues\textsuperscript{129} randomized 91 patients to either open excision or open excision with primary closure and followed them for up to 3 years. The main outcome measures were infection (3.6% of the closed group became infected vs 1.8% of the open group, \(P > 0.01\)) and recurrence (4.4% recurrence in the closed group vs 0% in the open group, \(P > 0.01\)). Despite these differences in favor of open excision the authors concluded that either method is acceptable, presumably because the rates of infection and recurrence, although significantly greater in the study, are still low. Kronberg and colleagues\textsuperscript{130} randomized 88 patients into 1 of 3 arms: open excision; excision with primary closure; and excision, primary closure, and the addition of clindamycin. This study included complete 3-year follow-up. No significant differences in time to healing were found in either primary closure group (14 vs 11 days, \(P > 0.10\)) regardless of the addition of clindamycin. The time to healing, however, was significantly longer in the open group versus the primary closure groups (64 vs 15 days, \(P > 0.001\)). No significant differences in recurrence rates were found between the groups (\(P > 0.40\)). Sondenaa and colleagues\textsuperscript{131} also examined the benefit of antibiotic prophylaxis and found none. These investigators randomized 153 patients, all receiving midline excision and primary closure, with and without cefoxitin prophylaxis. No difference in healing or recurrence was found after 4 weeks (\(P > 0.41\) vs \(P > 0.61\), respectively). Despite the short follow-up, cefoxitin prophylaxis was not recommended. One year later the same authors randomized 60 patients to open excision and 60 patients to excision with primary closure with a median follow-up of 4.2 years.\textsuperscript{132} They found no significant difference in recurrence between the groups and concluded that either method is acceptable.

Even less level I evidence exists regarding flap based or asymmetric closures off the midline for pilonidal disease. One large recent prospective series used the rhomboid (Fig 7), or Limberg, flap on 102 patients regardless of the severity of their disease.\textsuperscript{133} All of the patients healed eventually, but the authors did not specify a timeframe. They also reported a 4.5% complication rate and a 4.9% recurrence rate. The average time to return to normal activity was 7 days. Although this study is not level I evidence, it does show us that the majority of these patients treated with this method fared well in the short term. Unfortunately, we cannot conclude from this study that the rhomboid flap method is superior to midline excision as an initial surgical therapy, but the good results
suggest it may be an excellent option for use in patients with multiple recurrences or a chronic wound. Abu Galala and colleagues evaluated use of the rhomboid flap versus midline excision with primary closure; they randomized 46 patients to one of these treatments and then followed them for healing, wound breakdown, and recurrence. All of the rhomboid flap patients healed versus only 77% healing in the midline suture group ($P < 0.02$). In addition, 23% of the patients in the midline suture group experienced wound breakdown, whereas none in the rhomboid flap group experienced wound breakdown. After 18 months of follow-up 9% of the patients in the midline suture group had developed recurrence. None in the rhomboid flap group developed recurrence. The only other randomized, prospective trial regarding the rhomboid flap method evaluated the use of drains after operation. Erdem and colleagues randomized 40 patients and used a drain in one half. The study found no difference in wound healing or recurrence rate ($P > 0.05$). The drain group, however, had an associated longer hospital stay ($P < 0.001$). Hodgson and Greenstein published the only other randomized, prospective study on flap closure in 1981. This study examined Z-plasty versus midline excision, with or without marsupialization. The Z-plasty group required no additional surgery, but 40% of the patients in the open excision group did go on to have repeat operations. This study gives us the best available evidence that even open excision, although not prone to wound breakdown, does not completely rectify a patient’s wound issues, at least in the short term.

**Our Approach**

Based on this limited evidence one can draw a straightforward algorithm (Fig 8). First of all, any patient who presents with a pilonidal abscess should initially have incision and drainage off the midline, if
possible. Usually at the same time we will try to shave as much hair away from the midline area of involvement as possible. Two inches of shaving circumferentially around the area should suffice. The patient is then followed normally for a healing open wound. If the abscess is the initial presentation of their pilonidal disease, then we will simply continue shaving indefinitely at least once per week. This shaving must be meticulous and ritualistic to be successful. One single hair in a midline pit will keep it open. When patients present initially with simple midline pits and sinuses and various symptoms, such as pain and occasional drainage, but no infection or abscess, we will offer shaving again as the initial treatment. Patients who present with recurrent pilonidal disease (ie, abscesses, new pits, and so on) are more challenging. Simple shaving may still succeed in these patients depending on what treatments they have had in the past. If shaving has failed despite the best efforts of all involved, then we will typically proceed on to midline excision and curettage. We do not close these wounds primarily and we do not use antibiotics. Once this has been accomplished meticulous shaving should continue before
and after the wound has healed. Patients may also present after midline excision has failed in the past. If they have never used shaving during their treatment or have not used shaving properly with the vigilance required, we will offer midline excision again with the above admonishments. After all of these efforts have failed and the patient has shaved religiously and had 2 or more attempts at midline excision, then we believe it is more than reasonable to proceed on to an asymmetric closure or flap-based procedure. Our preference is for the rhomboid flap. This is a simple cutaneous flap, which has been a workhorse flap in plastic surgery for years. We have not had experience with skin grafts or myocutaneous flaps, such as the gluteus maximus flap, but these may also be successful. We would consider these procedures for disease involving a large surface area in the gluteal-sacral region, which requires wide excision and debridement. One must remember, however, that shaving of hair and hygiene of the gluteal cleft must continue, even after performing these seemingly aggressive and definitive procedures. In our experience, with time the gluteal cleft will reform right down the middle of whatever flap the surgeon has placed. Theoretically, then, the same conditions that led to the patient’s pilonidal disease in the first place will be present once again.

Conservative treatment should be the cornerstone of therapy. This includes meticulous shaving and hair removal by any means necessary and general hygiene. These measures should be performed before considering operation and after operation is performed to make good results more durable. The use of antibiotics and drains has not been shown to be helpful. More complications and recurrences occur with midline excision and primary closure than with open excision alone. However, time to healing is greater with open excision. In addition, even though the flap closures have better reported overall results, midline excision does seem to work most of the time. It may be more logical to reserve these more complex flap procedures for the long-suffering patient with multiple recurrences or a nonhealing wound. We believe John Bascom summed it up best: “There is no inherent weakness in midline skin. Instead, cleft conditions create disease in any skin lying there...The conclusion is inescapable: Midline (gluteal cleft) conditions will create pilonidal disease in any tissue that happens to lie there.”

Rectal Prolapse

Definition

Rectal prolapse, also known as procidentia, is a distressing condition that most commonly occurs in older women. The typical patient is a
multiparous woman in her seventh or eighth decade of life, although the problem may occur in either gender at any age. In its most blatant form, the condition manifests as a large, full-thickness protrusion of the rectum outside the anus, with concentric mucosal folds evident. In this situation, the appearance is quite different from the smaller radial folds seen with prolapsing hemorrhoids, or isolated distal rectal mucosal prolapse.

Initially, the prolapse may be hidden or “occult,” with no obvious external protrusion. This often progresses to subtle external prolapse that initially reduces spontaneously. Full-thickness rectal prolapse develops when there is a progressive internal collapse of the rectum, with loss of its normal anatomic attachments. This causes intussusception of the rectum with resultant protrusion through the anus. Once the anus is progressively stretched by the prolapse, it can allow more and more rectum to protrude.

In addition to the discomfort of prolapsing tissue, procidentia may cause symptoms of difficult or obstructed defecation, a sense of pelvic fullness, pressure, or tenesmus, and fecal seepage or incontinence. Occasionally the protruding tissue can become raw and bleed, but serious hemorrhage is rare.

**Diagnosis and Evaluation**

A focused anorectal examination should start with external inspection for altered anatomic features, masses, lesions, or gross patulousness. Some patients will present with overt prolapse without further straining or positioning. If the patient presents with a grossly prolapsed rectum, an attempt should be made to reduce the prolapse. Gentle squeezing and upward pressure on the prolapsed rectum will often result in reduction. If this is not easily accomplished, the maneuver can be aided by sprinkling the prolapsed tissue with granulated sugar and waiting 20 to 30 minutes. This often greatly reduces tissue edema and aids in manual reduction. If successful reduction of the prolapse is possible, elective operation should be planned in the near future since recurrence is a virtual certainty. An irreducible prolapse will require surgical intervention because the rectum is at risk of injury, bleeding, desiccation, strangulation, and infarction. Fortunately, a prolapsed, strangulated, necrotic rectum is a rare occurrence, but this would require immediate operation. In this situation an urgent perineal proctectomy would be advised, since this approach allows resection without bringing dead bowel and stool into the peritoneal cavity.

In patients in whom overt prolapse is not immediately visible, procidentia can sometimes be elicited with Valsalva and straining. Sometimes this is possible in the lateral decubitus position, but often it is necessary
to have the patient stand, squat, or sit over a toilet or towel while straining. A flashlight is a useful tool during a “toilet test” for rectal prolapse.

The physical examination should include an assessment of anal tone at rest and squeeze, a thorough digital inspection for palpable sphincter defects, and inspection of the anal canal and rectum for other lesions or abnormalities. Patients with rectal prolapse often have a lax and patulous anus due to chronic stretching of the anus by the prolapsed bowel. Internal rectal prolapse may cause a solitary rectal ulcer or cluster of inflammatory nodules that are usually seen in the midrectum anteriorly. These are typically detected on endoscopic inspection of the rectum. These lesions are benign, but do mandate evaluation and biopsies to exclude neoplasia.

A thorough evaluation of the entire colon and rectum is necessary, because it is essential to exclude proximal colonic pathology as an underlying cause of straining, resulting in prolapse. Studies have shown a marked increased incidence in the proportion of prolapse patients found to have colorectal cancer versus controls.137

A useful additional test in the evaluation of patients with rectal prolapse is videodefecography. Not only does this test delineate the extent of prolapse, but it also shows the degree of rectosacral separation, the presence of sigmoid redundancy, and the presence and size of associated rectoceles. In addition to having contrast material in the rectum, oral contrast is useful for visualizing associated enteroceles due to prolapse of the small intestine. Knowing about coexisting conditions preoperatively allows for a surgical management plan that can address all of the prolapse conditions with a single operation.

**Treatment**

Full-thickness rectal prolapse in adults can be treated definitively only with operation. The appropriate operation depends on the patient and his/her comorbid conditions. Several operations have been described for the treatment of rectal prolapse, but very little rigorous scientific evidence exists to determine which is the best operation. A recent evidence-based medicine review concluded that “it was impossible to identify or refute clinically important differences between the alternative surgical operations.”138 The decision as to which operation to perform involves a balance between potential surgical morbidity, correction of all identified pathologic conditions, and the likelihood of recurrent prolapse or other symptoms. Although a myriad of operations have been proposed and attempted for the treatment of rectal prolapse, the 2 main approaches are
perineal and abdominal, and with each there is a choice to resect or not to resect bowel.

Transabdominal rectopexy, with or without resection, has generally been shown to have the lowest recurrence rate (0% to 9%), with a morbidity rate of 15% to 30%.\textsuperscript{139,140} The decision to resect bowel usually depends on whether the patient has significant sigmoid redundancy or if the patient had significant constipation preoperatively. The finding of significant enterocele on videodefecography is usually best addressed during an abdominal procedure, by obliteration of the cul-de-sac or colpopexy. The use of mesh for rectopexy lends itself well as a site of fixation for the proximal vagina, should colpopexy be indicated. The relatively high morbidity rate of transabdominal surgical repairs is likely explained by the advanced age at which this condition usually occurs. Laparoscopic surgery for rectal prolapse has been described with and without bowel resection\textsuperscript{141-143} and appears to have similar outcomes to open operation.\textsuperscript{144,145} Randomized comparisons between open and laparoscopic rectal prolapse surgery have shown shorter hospital stay and smaller surgical scars in the laparoscopic group, but significantly longer operating times and equal functional outcomes.\textsuperscript{146,147} Few long-term follow-up data after laparoscopic repair are available.

Perineal operations for rectal prolapse are usually the safest option (morbidity of 0% to 12%), but have a greater chance of recurrence (0% to 50%)\textsuperscript{148-150} and do not allow for the correction of enterocele. A potential advantage of perineal rectal prolapse surgery is that it can be accomplished safely on an outpatient basis in most patients.\textsuperscript{148} The management of recurrent rectal prolapse should be based on the same rationale as the decision for primary repair, since the outcomes of surgery have been shown to be similar.\textsuperscript{151} Associated prolapse conditions can be treated concomitantly with transabdominal surgery utilizing either combined rectopexy and colpopexy or a “total pelvic mesh repair.”\textsuperscript{152} After operation, diminished sphincter tone will generally greatly improve over the ensuing 6 to 12 months, once the prolapsus is no longer stretching the sphincter on a regular basis.

**Our Approach**

After a history and physical examination, we generally obtain a videodefecogram with oral contrast. For those with significantly diminished sphincter tone, preoperative testing of pudendal nerve terminal motor latency, as well as transanal ultrasound, can aid in the preoperative assessment of a possible obstetrical injury, however remote, and may have implications for a later sphincter repair in the occasional candidate.
who does not fully recover sphincter function postoperatively. Colonoscopy (preferentially) or barium enema are used to exclude proximal colonic conditions.

For the middle-aged to elderly patient without enterocele or significant descent of the rectum away from the sacrum on videodefecography, we usually recommend a perineal approach. A rectocele, if present, can often be repaired concomitantly. For the patient with significant recto-sacral separation, enterocele, redundant sigmoid, or constipation, we generally favor an abdominal mesh rectopexy, with or without sigmoid resection, and colpopexy as indicated. Significant rectoceles can be repaired concomitantly via the abdominal approach. For the patient with fecal incontinence persisting for many months after correction of prolapse and similar defects, sphincteroplasty may be possible if pudendal nerve function is adequate, and there is a definite sphincter defect noted. Alternatively, an artificial bowel sphincter, graciloplasty, or colostomy may be considered in selected patients.

**Fecal Incontinence**

*Definition*

Fecal incontinence is a physically and psychologically disabling problem. It is estimated that 1% to 7% of healthy adults after age 65 suffer from some degree of fecal incontinence, and it is the second leading cause of institutionalization in the elderly.153,154

Fecal incontinence can be defined as the inability to defer bowel movements to a socially acceptable time and place. Subjective complaints by patients may range from inadvertent passage of flatus, minimal leakage of liquid stool, to complete lack of ability to control solid bowel movements. The degree to which symptoms are troubling to the patient will depend not only on their coping skills, but also on the frequency, severity, and nature of the problem.

Fecal incontinence occurs much more commonly in women than in men, primarily due to the effects of childbirth and aging on the female pelvic floor and anal spincter.154-156 Other etiologic causes of fecal incontinence include previous anorectal surgery or trauma, fecal impaction with overflow, rectal prolapse, hemorrhoids, primary gastrointestinal disease, neurologic injury or disease, medications, pelvic irradiation, and congenital malformations.

Many grading systems have been described to help define fecal incontinence objectively.157 Although there is no strict consensus on which grading system to use, it is always important to find out exactly
what a patient means when they complain of fecal incontinence. For some patients a minor occasional seepage or staining of the undergarments is of grave concern, whereas other patients may not present until they are grossly incontinent to solid stool.

**Diagnosis and Evaluation**

An approach to the patient with fecal incontinence should begin with an understanding of the factors necessary to preserve normal continence. These include normal central nervous system function, normal stool volume and consistency, normal gastrointestinal transit, correct anatomic position and fixation of rectum, normal rectal distensibility (compliance), normal anorectal sensation, functioning anorectal/pelvic floor reflexes, and an intact and functioning anal sphincter.

Once the above factors are considered and understood, a logical approach to the patient with fecal incontinence is possible. For example, a patient presenting with high volume loose stools and fecal incontinence may receive dramatic benefit from a bulk fiber product and a reduction in excess oral fluid intake, once organic and structural disease has been excluded.

The history is vital in evaluating the patient with fecal incontinence. It is essential to determine what the patient’s normal bowel pattern has been, when a change was noted, and whether incontinence is occurring with gas, liquid stool, or solid stool. Is the problem constant or intermittent, and are there any obvious aggravating or relieving factors? Associated symptoms such as bleeding, prolapase, or pain will guide the evaluation and management decisions. In parous women, an obstetrical history should record the number of vaginal deliveries, the size of each baby, the duration of second stage of labor (“pushing”), whether forceps were used, and whether there were any third- or fourth-degree tears. Of these factors, the presence of obstetrical tears extending into the sphincter complex has been found to correlate most closely with fecal incontinence.\(^\text{158}\)

Taking a complete dietary history is important, with special attention to the type and volume of fluids consumed. There is a widely held belief that drinking as much fluid as possible is beneficial. However, excess intake of fluid, particularly caffeine and alcohol, is a major contributor to loose stools and incontinence. A detailed dietary history should also determine whether the patient has any apparent lactose or gluten intolerance.

Another important area to cover in the history is the presence of associated medical conditions. Of particular concern are multisystem disorders such as diabetes, or neurologic conditions. A complete review of a patient’s medications should direct attention to any new
medicines that correlate with the beginning of the incontinence. Any past history of anorectal/gastrointestinal surgery or trauma should also be documented.

In women, fecal incontinence is commonly seen in association with general pelvic floor prolapse and dysfunction. Therefore, associated symptoms such as urinary incontinence and vaginal or rectal prolapse should be elucidated.

After a thorough history has been completed, a focused physical examination should be performed. The abdominal examination should identify masses, tenderness, and hyperactive bowel sounds. External anal examination should begin with a look at the perianal skin. A raw, excoriated anus is often the sign of frequent loose stools, seepage of feces or mucus, or prolapse of tissue. With the patient straining over a toilet or towel, examination for perineal descent, and vaginal or rectal prolapse should be possible. Inspection should show whether the anus is symmetrical, patulous or gaping, or has any distortion or scarring. In women the length and condition of the perineal body and presence of associated vaginal prolapse is important. Inspection can also be used to visualize enlarged external hemorrhoids, rectal prolapse, anal fissures, or skin tags.

A tremendous amount of information can be gleaned from a proper digital anorectal examination. Anal canal resting and squeeze tone, length and symmetry of the anal sphincter, lumps or masses, integrity of the rectovaginal septum (rectocele), and the presence of fecal impaction should be determined. Anoscopy should be used to visualize internal hemorrhoids or distal rectal prolapse. Rigid sigmoidoscopy can be used to assess the rectal mucosa, the distensibility of the rectum, and the presence of prolapse, polyps, masses, ulcers, or blood.

Once a thorough history and physical examination have been completed, further investigations can be performed. Unless it has already been done, patients should undergo colonoscopy to identify any organic and structural colonic disease. Selective use of barium enema, upper gastrointestinal series/small bowel follow-through, and esophagogastroduodenoscopy (EGD) are used to identify other primary gastrointestinal problems. A complete evaluation of the anal sphincter mechanism requires anorectal manometry and pudendal nerve testing, and an ultrasound of the anal sphincter itself, looking for occult muscle disruption.

Videodefecography with rectal and oral contrast is an important test to identify associated rectal prolapse, enterocele, and rectocele. It will also show perineal descent and degree of relaxation of the pelvic floor musculature. More detailed radiologic imaging with CT or MRI is used selectively.

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**Approach to Treatment**

The purpose of the history, physical examination, and ancillary investigations is to identify central nervous system impairment, congenital problems, primary gastrointestinal disease or diarrheal illness, associated medical conditions, medication reactions, fecal impaction, dietary indiscretion, hemorrhoids and prolapse, rectal dysfunction, sphincter integrity, and nerve dysfunction. Any factors that are identified must be addressed and treated if possible. Once this has been accomplished a logical treatment algorithm can be constructed.

First it is important to normalize the patient’s bowel pattern. A patient with frequent high volume, loose stools or recurrent fecal impaction with overflow diarrhea will not be cured of incontinence until the bowel pattern is improved. After excluding organic disease, loose stools can be treated by decreasing daily fluid intake and starting fiber supplements (fiber tablets, supplied with only a small amount of water, are often effective here), sometimes including loperamide. Hard stools should be treated with a bulk fiber laxative taken with 8 to 16 oz of water, and the daily fluid intake should be increased. If adjustment of fiber and fluid alone is not sufficient, a more intensive medical regimen may be needed. Persistent constipation with overflow incontinence may require a regular enema program.

Next, any associated hemorrhoids or prolapse conditions should be treated appropriately. The next line of treatment for fecal incontinence may involve perineal strengthening exercises (Kegels), with or without biofeedback. With biofeedback, a sensing device provides visible and/or audible means of assessing and training muscle contraction. Efficacy of pelvic floor rehabilitation and biofeedback varies with patient compliance, with intact pudendal nerve function and sensation, and the therapist’s motivation and ability. Success rates are typically 60% to 80% with biofeedback and rehabilitation, but maintenance training is often necessary or the results deteriorate.159-161

If the patient’s bowel pattern has been normalized and she has completed a trial of rehabilitation and biofeedback, but is still incontinent of feces, plus investigations show evidence of anatomical and/or neurological problems, operation should be considered. Options for surgical management include direct native muscle repairs (ie, sphincter apposition, or overlapping sphincteroplasty). Such repairs are only helpful if there is evidence of muscle discontinuity and adequate pudendal nerve function. More complex repairs involve construction of a neosphincter using gluteus or gracilis muscle, or a
Silastic artificial bowel sphincter. A promising new technique now in the investigational stage involves the insertion of a sacral nerve stimulator, with no direct operation on the sphincter mechanism itself.

Although a complete discussion of surgery for fecal incontinence is beyond the scope of this text, it is worth mentioning that reconstructive surgery is reserved for only a small number of patients with fecal incontinence. For the thin, healthy, young patient who has a definable muscle defect (usually young women after obstetrical trauma), the overlapping sphincteroplasty is the gold standard repair. Acceptable early postoperative continence is usually achieved in 80% to 90% of patients, but this may deteriorate over time.\textsuperscript{162-164}

For older patients, or patients with multifocal sphincter defects, failure of previous repairs, or inadequate native tissue for direct sphincter repair a more major reconstructive operation may be indicated. Due to the present United States unavailability of the stimulator for the dynamic graciloplasty operation, the artificial bowel sphincter (ABS) is currently the operation of choice for good operative candidates who require major restorative sphincter surgery. Although device loss from infection and overall morbidity is high with the ABS, when the device remains in situ and is functioning, the quality of life is significantly improved.\textsuperscript{165-167}

A new and emerging modality for the treatment of fecal incontinence is sacral nerve stimulation. The ideal candidate has a weak but intact anal sphincter. This technique has been described for the treatment of urinary problems since the 1960s. Typically therapy is started with an initial trial of S3 stimulation using a removable external device. If the patient has significant improvement with the temporary device a permanent device is inserted. Studies have confirmed that sacral nerve stimulation significantly improves continence and quality of life in selected patients with fecal incontinence. The device is only investigational in the United States at this time.\textsuperscript{38,168,169}

An end colostomy is usually seen as a last resort for patients with fecal incontinence, but it is often the most appropriate therapy and is not indicative of failure. A patient will generally fare much better with a colostomy than with uncontrollable fecal incontinence. A colostomy is often appropriate therapy in patients with severe anorectal tissue loss, significant lack of tissue integrity, or associated serious rectal or colonic dysfunction. It is also an appropriate first-line treatment in severely impaired individuals in whom compliance and wound care after more complex procedures would be impossible.
Our Approach

After a thorough history and examination, we concentrate on 3 areas: stool consistency, sphincter tone, and the presence of prolapsing hemorrhoids or rectal prolapse. If loose stool is contributory to the problem, and further evaluation of this aspect of the problem is not indicated, we ask the patient to diminish gratuitous fluid intake, check for lactose intolerance if indicated, and provide fiber tablets, taken with very little water, to thicken up the bowel movement. Imodium or Lomotil may also be used in recalcitrant cases, in the absence of gastrointestinal disease. If there is prolapse of tissue, we address this as noted above. If diminished sphincter tone is noted and thought to be due to prolapse, we assess this after correction of the prolapse problem. If the sphincter is felt to be damaged, anorectal manometry, pudendal nerve testing, and transanal ultrasound are performed to assess the success of possible sphincteroplasty. If a definite defect is seen or felt, and pudendal nerve function is normal or near normal, there is a 90% chance of success with sphincteroplasty. If pudendal nerve function is poor, the practical alternatives are no therapy, artificial bowel sphincter, or colostomy.

The opinions and assertions contained herein are the private views of the authors and are not to be construed as official or as representing the views of the Department of the Army or the Department of Defense.

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