Concepts in Surgery of the Anus, Rectum, and Pilonidal Region

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Anatomy and Physiology

The anorectum is a particularly complicated region and function is dependent on many variables. In order to effectively treat disease of the anus and rectum, it is critical to have a solid understanding of the anatomy and physiology of the region.

The anal canal is typically 3–4 cm in length and represents the terminal segment of the gastrointestinal tract. It extends from the anorectal junction to the anal verge, which represents the edge of the anal orifice. Distal to the anal verge, the skin is pigmented and contains hair follicles and glands. Within the anal canal is the dentate line, a wavy demarcation which represents the mucocutaneous junction. Proximal to the dentate line is transitional epithelium; distal to the dentate line is anoderm made up of squamous epithelium, and therefore, there is cutaneous sensation in this area. Along the dentate line are anal glands and crypts.

Hemorrhoids are sinusoidal fibrovascular cushions which exist in the submucosal space of the anal canal. Hemorrhoids that occur proximal to the dentate line are termed internal hemorrhoids, whereas those that occur distal to the dentate line are termed external hemorrhoids. Hemorrhoids are part of normal anatomy that contribute to baseline anal continence. In addition, during times of increased intra-abdominal pressure, such as during coughing or sneezing, the vascular cushions engorge, maintaining continence.

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The anal canal is surrounded by cylindrical muscles that make up the anal sphincter: internal anal sphincter and external anal sphincter (Fig. 67.1). The internal anal sphincter is made up of smooth muscle and is contiguous with the smooth muscle of the rectum. It is supplied by sympathetic and parasympathetic nerves and thus is under involuntary control. The internal anal sphincter provides half of the resting anal tone, which is the baseline muscle tone which maintains anal continence during periods of inattention. The remainder is contributed by the external anal sphincter and the puborectalis muscles. The external anal sphincter surrounds the internal anal sphincter and is made up of cylinder of skeletal muscle. The innervation is derived from the sacral and pudendal nerves. In response to increased abdominal pressure (such as coughing and sneezing) or rectal distention, the external anal sphincter and puborectalis muscles contract reflexively and voluntarily to increase anal tone and maintain fecal continence. The levator ani muscles are broad muscles that make up the pelvic floor.

Several potential spaces exist around the anal canal (Fig. 67.1). The space between the internal and external anal sphincter is termed the intersphincteric space. The intersphincteric space is contiguous with the perianal space which surrounds the external portion of the anus circumferentially. Lateral to the external sphincter muscle on each side is the ischiorectal space which is also bound by the levator ani muscles superiorly and the ischial tuberosities laterally. These two ischiorectal spaces connect posteriorly though the deep postanal space, which lies between the levator ani and the anococcygeal ligament. The supralevator space, as the name suggests, lies superior to the levator ani muscles in a horseshoe shape around the rectum.

Anorectal Examination

Complete anorectal examination includes visual inspection, digital rectal examination, anoscopy, and proctoscopy. Patient positioning in the office setting can be either left
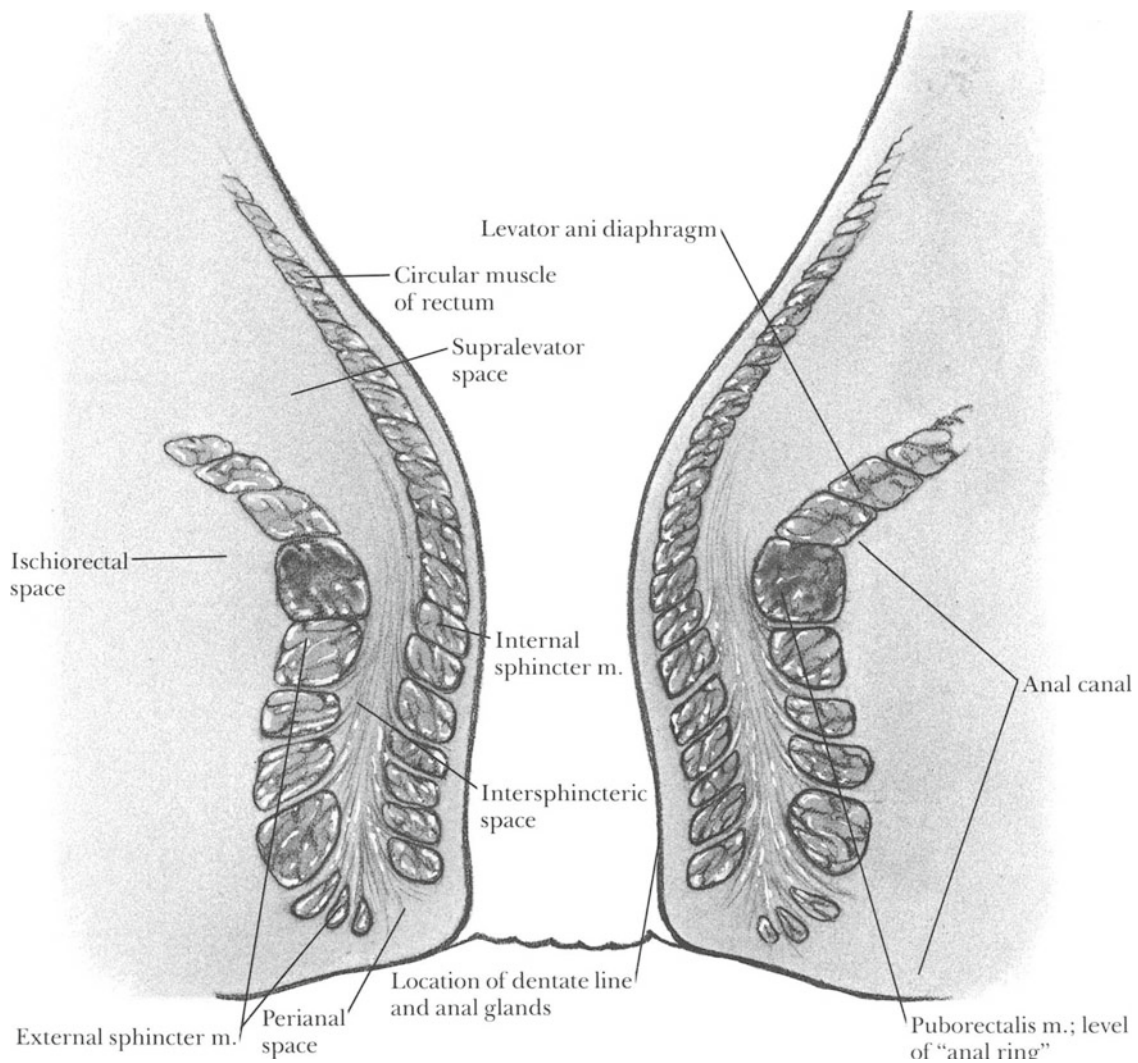
Fig. 67.1

lateral decubitus or prone jackknife if a Ritter table is available. Good lighting is paramount. Inspection of the anal area is the first portion of the anorectal examination and should be done with the buttocks retracted laterally. Abnormal masses, scarring, swelling, erythema, fluctuance, fissures, and hemorrhoidal enlargement or thrombosis should be noted. The next step is the digital rectal examination which should be performed with a lubricated gloved finger. The anal canal is examined for masses, induration, stricturing, or the presence of a rectocele. Baseline anal tone should be noted and the patient is asked to squeeze their anal sphincter in order to evaluate anal squeeze function. Next, anoscopy is performed to further evaluate the anal canal. Several types of anoscopes are available and should be utilized according to operator

preference. Anoscopic examination assists evaluating the mucosa of the distal rectum and anal canal. Hemorrhoidal disease and mucosal abnormalities can be evaluated. Proctoscopy, either rigid or flexible, should be utilized to evaluate the rectum. Administration of a saline enema prior to the examination facilitates mucosal evaluation.

Ambulatory Management

Many common anorectal conditions such as hemorrhoidal rubber band ligation can be managed in the office setting. The components for successful treatment in this setting include a willing patient, an appropriate environment, and the correct instrumentation. Patients with severe anorectal pain precluding adequate examination are unlikely candidates for office treatment and should be treated with adequate anesthesia in an appropriate setting.

The need for excellent lighting cannot be understated and the absence of headlights or procedural lighting can be a significant barrier to performing anorectal procedures in the office setting. The prone jackknife position is most often used for treatment in this setting. If a table for prone positioning is not available or the patient is unable to accommodate this position, the Sims' position may be used with the patient on their left side, left leg extended and right leg flexed. A trained assistant is invaluable for exposing the gluteal crease, supporting the anoscope, passing instruments, and comforting the patient.

Local Anesthesia for Anorectal Procedures

Local anesthesia can be used for office procedures alone or combined with sedation for procedures performed in the operating room. A common technique involves injection of bupivacaine (0.25 %) with epinephrine (1:200,000). Buffering the anesthetic solution with 0.5 ml of 8.4 % sodium bicarbonate immediately before injection decreases pain. Five ml of anesthetic solution is injected into each quadrant of the subcutaneous tissues around the anus. This is followed by injecting 10 ml of solution just lateral to each side of the anal sphincter.

Operating Room Positioning

For operative anorectal surgery, both high-lithotomy and prone-jackknife positioning are used. Both positions offer different advantages and disadvantages. Lithotomy position is preferred from the standpoint of anesthesia, as it is perceived to be safer in the intubated patient. In the author's experience, most anorectal procedures can be done well in this position. Prone- jackknife positioning has a distinct advantage when dealing with anterior rectal pathology such as performing transanal excision of an anterior rectal lesion, as the operator is looking down on the lesion. This position must also be used for the treatment of pilonidal disease as the upper gluteal crease is not exposed in high-lithotomy position.

Clinical Conditions: Symptoms and Management Concepts

Hemorrhoids

Hemorrhoidal disease is the most common anorectal complaint for which patients present to physicians, and often the actual diagnosis is unrelated to hemorrhoids. Hemorrhoids are a normal part of anorectal anatomy, but they can enlarge secondary to chronic straining. When internal hemorrhoids enlarge, the overlying mucosa can become thin and friable which leads to bleeding with minimal trauma. This bleeding is typically painless and bright red in nature. It may range from a small amount on the toilet paper to dripping in the toilet bowl, but it is typically self-limited. Chronic straining can also lead to prolapse of internal hemorrhoidal tissue. Severity of internal hemorrhoids is categorized according to degree of prolapse. First-degree internal hemorrhoids do not exhibit any prolapse with straining. Second-degree internal hemorrhoids prolapse with straining, but spontaneously reduce. Third-degree internal hemorrhoids prolapse but reduce only with manual pressure. Fourth-degree internal hemorrhoids are not reducible. Degree of prolapse is best evaluated by asking the patient to sit on the commode and simulate having a bowel movement.

Treatment of internal hemorrhoids varies based on the degree of prolapse. All patients should be placed on bulking agents and instructed to drink plenty of fluids in order to minimize straining and regulate stool consistency. Often, this may be all that is required to treat first-degree internal hemorrhoids. If bleeding persists or prolapse is present, additional therapy may be necessary. There are several office-based procedures which are popular for treating internal hemorrhoids, and these include sclerotherapy, infrared coagulation, and rubber band ligation, which is our preference. Rubber band ligation involves placement of a strangulating rubber band on the redundant rectal mucosa. This procedure removes some of the redundant mucosa but more importantly fixes the mucosa to the underlying submucosa hopefully thereby preventing prolapse. These therapies are most successful with first- or second-degree internal hemorrhoids. Persistent symptoms after rubber band ligation require hemorrhoidectomy. Typically, third- and fourth-degree internal hemorrhoids as well as mixed internal and external hemorrhoids also require hemorrhoidectomy. This can be performed as a conventional excisional hemorrhoidectomy or, in selected cases, the so-called stapled hemorrhoidectomy or procedure for prolapsed hemorrhoids (PPH) may be employed. PPH removes mucosal tissue circumferentially and creates a mucosal anastomosis. It is therefore typically performed in patients with circumferential and more extensive internal hemorrhoidal disease.

Similar to internal hemorrhoids, external hemorrhoids can enlarge with chronic straining. External hemorrhoids are generally asymptomatic, but when thrombosis occurs, patients present with an acutely painful perianal lump. Thrombosis is often associated with pregnancy or exertion, such as lifting or straining. Within the first 72 h of onset, surgical excision may be performed to hasten recovery. Thrombosed hemorrhoids usually consist of multiple small thrombi; therefore, incision and drainage is generally ineffective and should be avoided. After this time period, the thrombosis usually begins to soften and become less painful. At this stage, it is generally recommended that treatment consist of supportive measures including sitz baths, pain control, and avoidance of constipation. With enlargement of the vascular cushions of the external hemorrhoids, the overlying skin can become redundant leading to the development of external hemorrhoidal tags. These are typically asymptomatic and require no treatment. Large skin tags may cause significant hygiene problems and secondary skin irritation and may be treated by excision.

Anorectal Suppurative Diseases

Most anorectal abscesses are thought to originate in the anal glands and crypts around the dentate line and represent enteric bacteria. While most abscesses occur in healthy individuals, risk factors include diabetes, Crohn's disease, perianal surgery, and human immunodeficiency virus positivity. There are four types of anorectal abscesses, and classification depends on anatomic location. Intersphincteric abscesses occur between the internal and external sphincter muscles. Perianal abscesses occur around the anus just under the perianal skin and are the most common type of anorectal abscess. Ischiorectal abscesses occur in the ischiorectal space. Because the ischiorectal spaces on either side of the anus are connected posteriorly through the deep postanal space, an ischiorectal abscess can present as a horseshoe abscess which nearly encircles the anorectum. Supralevator abscesses occur superior the levator ani muscle. These abscesses may be a result of anal cryptoglandular infection versus an intra-abdominal process.

The most common presentation for an anorectal abscess is severe constant anorectal pain, erythema, warmth, induration, and fluctuance. Fever and elevated white blood cell count may be present. However, depending on the location of the abscess, these symptoms may not be present. For example, intersphincteric abscesses typically present with pain and a normal external anal examination. Similarly, patients with a supralevator abscess present with a normal external anal examination. Digital rectal examination may reveal a rectal fullness suggestive of an abscess. Physical exam is sufficient for diagnosing most anorectal abscesses. Imaging is an important adjunct when a complex disease is suspected, there is early recurrence of a previously drained abscess, or an abscess is suspected but the external physical examination is normal. Computed tomography and magnetic resonance imaging are the most common imaging modalities utilized.

Appropriate treatment of anorectal abscesses includes incision and drainage. Straightforward abscesses can be treated in the office, emergency department, or operating room settings, depending on size, severity, and patient discomfort. Drainage is typically performed by incising the skin overlying the abscess as close to the external sphincter as possible. However, there are a few special circumstances which must be noted, and these are best treated in the operating room. Intersphincteric abscesses should be drained by internal sphincterotomy. Horseshoe abscess are treated by draining the deep postanal space and counter-incisions in the ischiorectal fossa. Treatment of supralevator abscess
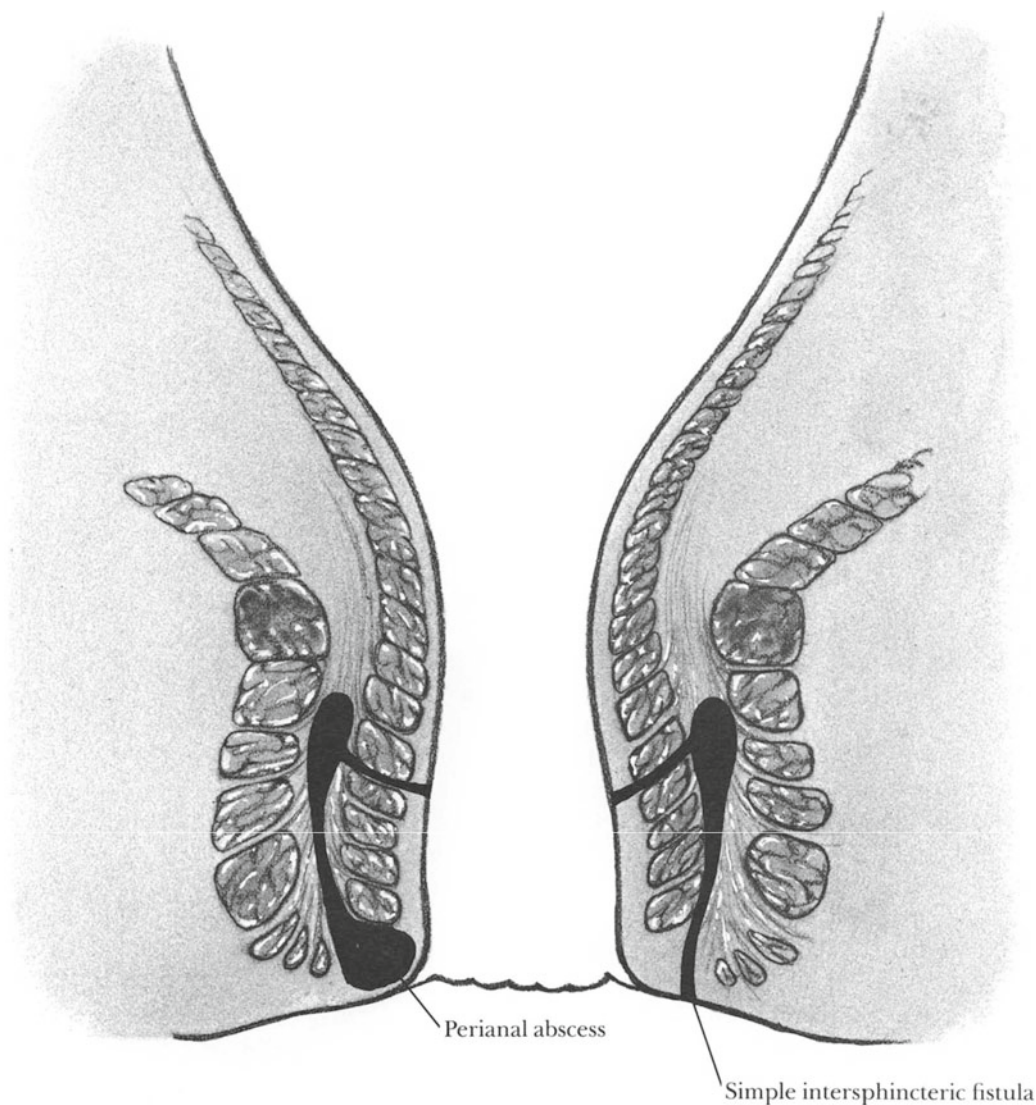
Perianal abscess

Simple intersphincteric fistula

Fig. 67.2

depends on the source of the infection. Antibiotics are not indicated in the treatment of anorectal abscesses unless the patient is immunocompromised, there is a significant systemic response, or there is associated cellulitis.

Approximately one-third of patients with an anorectal abscess will subsequently develop an associated anal fistula. It is important to warn patients about this possibility at the time of abscess drainage. Anal fistulas can be defined according to the relationship to the external sphincter. Intersphincteric fistulas (Fig. 67.2) travel between the internal and external sphincter. Trans-sphincteric fistulas (Fig. 67.3) traverse part or all of the external sphincter. Suprasphincteric fistulas (Fig. 67.4) result from supralevator

abscess and the tract surrounds the puborectalis and external sphincter muscles. Extrasphincteric fistulas (Fig. 67.5) originate above the level of the levators and pass through the ischiorectal fossa to the perianal skin.

Recurrent or chronic pain and drainage are the common symptoms associated with anal fistulas. On examination, an external fistula opening is usually visible and located at the previous site of incision and drainage. Patients with a suspected fistula should be evaluated in the operating room. Examination should include proctoscopy to rule out inflammation of the anorectum. Anoscopy is critical to identify the internal opening of the fistula, which is most often located at the dentate line. Fistula probes and hydrogen
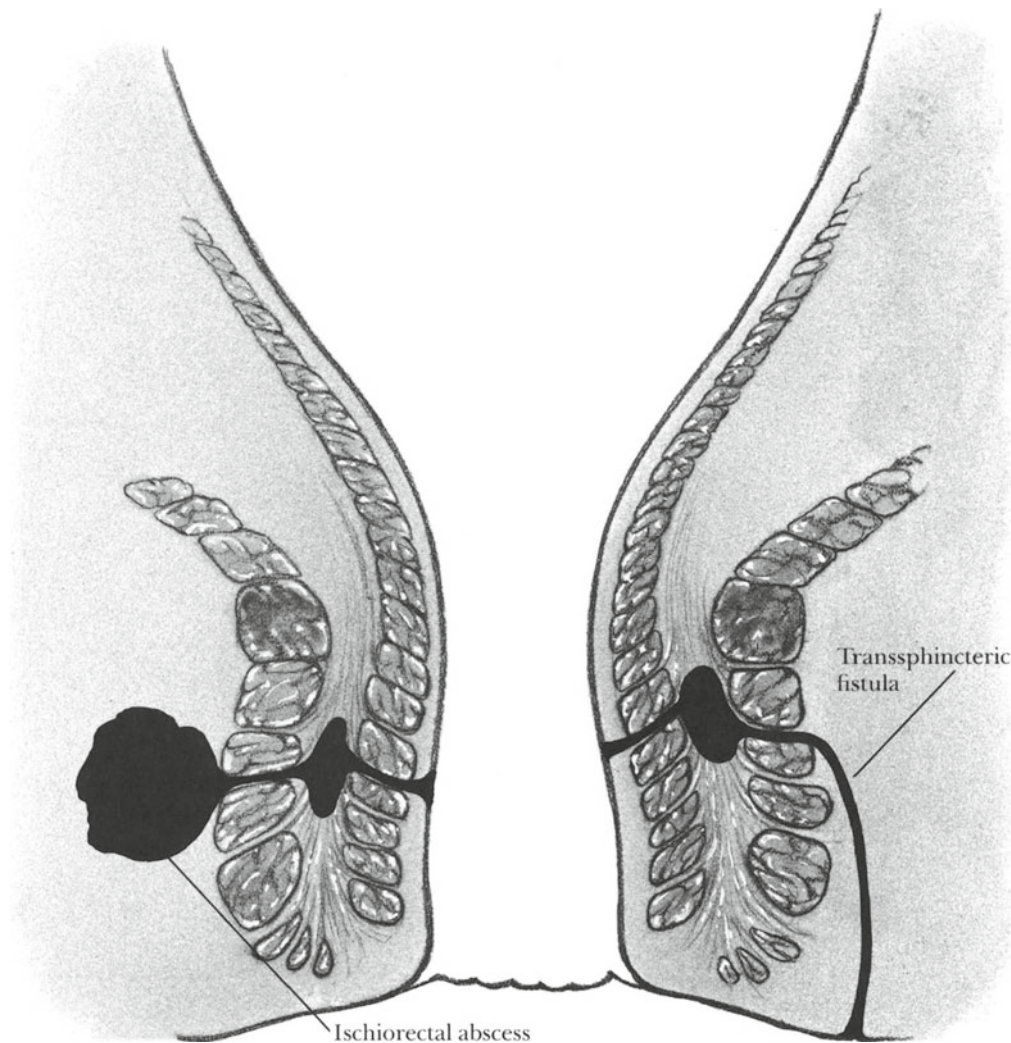
Fig. 67.3

peroxide can be used to elucidate the fistula tract. If the fistula tract cannot be determined, imaging studies such as ultrasound or magnetic resonance imaging of the pelvis may be helpful. It is critical to determine the amount of anal sphincter distal to the fistula tract as this determines the treatment options.

If the fistula tract involves less than 30 % of the anal sphincter, primary fistulotomy can be performed with good results. In female patients with anterior fistulas, patients with poor anal continence, patients with Crohn's disease, or patients with fistulas involving a significant portion of anal sphincter, primary fistulotomy should be avoided. For these patients, a draining seton should be placed to facilitate sepsis resolution and maturation of the tract. Cutting setons should be avoided. Following seton placement, definite fistula repair can be attempted. Several approaches have been described for fistula repair: fistula plug, fibrin glue, anorectal advancement flap, or ligation of intersphincteric fistula tract (LIFT) procedure.

Anal Fissure

Anal fissures are epithelial defects within the anal canal. Current theory regarding the etiology of typical anal fissures is that the spasm of the sphincteric mechanism results in decreased blood flow to the lining of the anal canal and that the resultant relative ischemia produces poor healing. They are most often caused by the trauma of defecation and should never extend above the level of the dentate line or out onto the anal verge. The biomechanics of the anal canal are such that most fissures occur in the midline posteriorly or, less commonly, anteriorly. Fissures occurring in the lateral position are uncommon and termed atypical. They are generally due to other pathophysiology including Crohn's disease, lymphogranuloma venereum, HIV or other viral infection, or being immunocompromised. These fissures may also be unusually broad or deep.

Pain from anal fissures originates both from pain at the site of injury and also from spasm of the internal and external
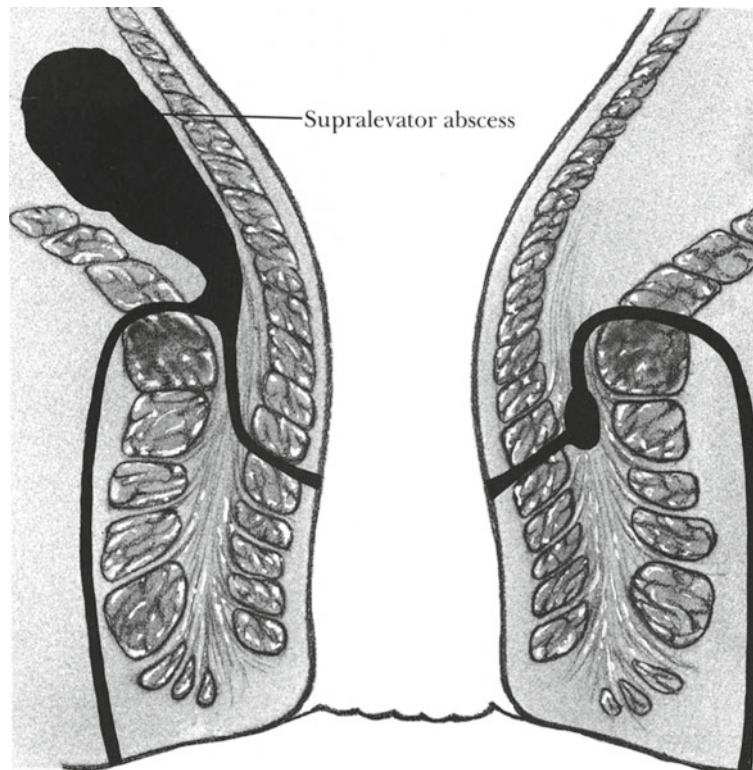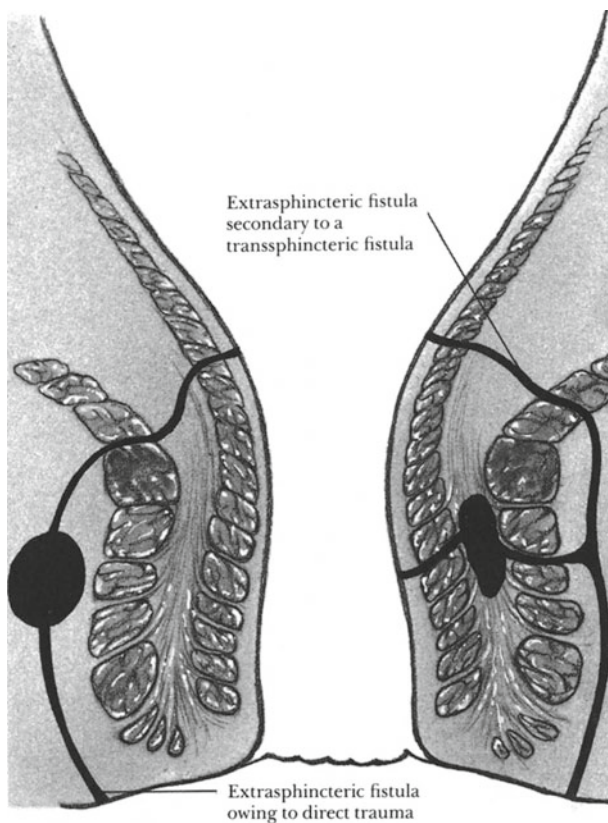
Fig. 67.4

Fig. 67.5

anal sphincters. Despite this spasm, it should be possible to see an anal fissure by gently spreading the skin of the anal verge and lower anal canal.

Anal fissures usually cause painful bowel movements and some degree of rectal bleeding. Reducing the anal canal pressure medically or by dividing a portion of the internal sphincter increases anal canal blood flow and promotes healing of the anal fissure. Medical therapy of an anal fissure should almost always precede surgical therapy. Stool-bulking agents such as psyllium seed or methylcellulose in quantities sufficient to provide bulky soft stools reliably are the mainstays of medical therapy. The goal with these agents is to achieve a relatively atraumatic stool consistency without diarrhea. Stool softeners may also be helpful in achieving this goal, but laxatives should be avoided.

Topical calcium-channel blockers in the form of diltiazem gel (2 %) or nifedipine gel (0.3 %) are highly effective when applied to the perianal skin TID and combined with an effective bowel regimen. Persistence of a painful anal fissure for 6 weeks on good medical therapy or development of a complication such as infection constitutes an indication for lateral internal sphincterotomy. Alternatively, chemodenervation of the anal sphincter using botulinum toxin injection in either an office or operative setting may be used without causing permanent alteration of anal sphincter function. This treatment may be preferred in patients with impaired fecal continence.

Fissures that fail to respond to therapy or those that are associated with plaques or an exophytic mass should undergo biopsy to rule out dysplasia or malignancy. Atypical fissures are generally treated by addressing the underlying pathophysiology.

Anal Stenosis

Anal stenosis is a pathologic constriction of the anal canal. The most common etiologies include prior anorectal surgery, external-beam radiation therapy, Crohn's disease, and neoplasm. Patients with anal stenosis often complain of constipation, ribbonlike stools, painful defecation, and the inability to perform enemas.

Patients with severe anal stenosis may require proximal fecal diversion prior to other management of the stenosis. For patients with Crohn's disease and neoplasm, the underlying condition should be the focus of initial management.

For mild anal stenosis, a bowel regimen and manual anal dilatation may be sufficient to provide relief from difficult defecation. For more severe forms of stenosis, manual dilatation will be too difficult or painful for the patient to perform and may be done by the surgeon under anesthesia. Severe stenosis is unlikely to have a durable result from dilatation, however.

The mainstay of surgical treatment of anal stenosis is anoplasty, during which a vascularized skin flap from the perianal and buttock region is advanced into the anal canal after dividing the anal constriction. The skin flap is then secured in the anal canal with sutures. Following healing of the flap, anal dilatation is often performed to maintain long-term patency.

Rectal Prolapse

Rectal mucosal prolapse may occur with hemorrhoidal disease (see above). Full-thickness rectal prolapse is different. This is recognized by concentric folds of rectal mucosa as apposed to a mucosal rosette. Both perineal and abdominal operations are available to correct the problem and are included in this text. Young, physiologically fit patients may be best served by a transabdominal operation, although more recently this has been challenged. Transabdominal approaches usually include rectopexy. Older patients may be better served with a perineal operation. The perineal operations provide better control of prolapse with less morbidity than the old Thiersch procedure (included as a surgical legacy procedure).

Pilonidal Disease

Pilonidal disease is not an anorectal disease in the purest sense. Its association with anorectal disease is only by proximity. Pilonidal disease is a term used to describe infections that originate in the gluteal cleft. It is currently thought to be an acquired rather than a congenital disorder. The precise sequence of events is debated, but there is an agreement that the shape of the gluteal cleft and its effect on loose hair in this region leads to penetration of hair underneath the skin. This leads to formation of chronic subcutaneous abscesses that contain hair. Multiple infectious episodes create multiple openings along the midline and lateral to it that can mimic other anal conditions. The variety of operations that have been described for this condition suggest that there is no solitary infallible procedure for cure. Current trends are toward less radical surgery. Avoidance of a midline wound, removal of the foreign material from the abscess cavity, and removal of hair in the region of the gluteal cleft by shaving or tweezing seem to be important elements for obtaining a healed wound.

Further Reading

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