

13. Anorectal Abscess and Fistula

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Abscess

- Anorectal abscess and fistula-in-ano represent different stages of anorectal suppuration.
- The abscess is the acute inflammatory event.

Anatomy

- Ducts from anal glands empty into the anal crypts at the level of the dentate line.
- Anal glands penetrate into deeper tissue: 80 % submucosal, 8 % internal sphincter, 8 % conjoined longitudinal muscle, 2 % intersphincteric space, and 1 % penetrate the internal sphincter.
- Understanding the potential anorectal spaces (Table 13.1) is essential for successful treatment of anorectal suppuration.

Pathophysiology

Etiology

- Table 13.2 lists the etiologies of anorectal abscesses. 90 % are from non-specific cryptoglandular suppuration.
- Abscesses result from obstruction of the anal glands (Park's cryptoglandular theory published in 1961).
- Persistence of anal gland epithelium in the tract between the crypt and the blocked duct results in fistula formation.

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Table 13.1 The potential spaces of the anorectum and their boundaries

Potential space	Superior border	Anterior border	Inferior border	Posterior border	Lateral border	Medial border	Other features
Perianal space			Anal verge		Becomes continuous with the ischioanal fat	Lower portion of anal canal	Continuous with the intersphincteric space and forms the most common abscess
Ischioanal space		Transverse perineal muscles		Lower border of the gluteus maximus and sacrotuberous ligament	Obturator internus	Levator ani and external sphincter muscle	Extends from the levator ani to the perineum. If the deep postanal space becomes infected, pus can spread circumferentially via the ischioanal space and this could form a horseshoe abscess
Intersphincteric space	Rectal wall		Continuous with perianal space				Lies between the internal and external sphincters. If infected, pus can spread circumferentially
Supralelevator space	Peritoneum		Levator ani muscle		Pelvic wall	Rectal wall	The rarest abscesses form from this space. If infected, pus can spread circumferentially
Deep postanal space	Levator ani muscle		Anococcygeal ligament	Tip of the coccyx			Pus can spread circumferentially via the ischioanal space and form a horseshoe abscess

Table 13.2 Etiology of anorectal abscess

Nonspecific
Cryptoglandular
Specific
Inflammatory bowel disease
Crohn's disease
Ulcerative colitis
Infection
Tuberculosis
Actinomycosis
Lymphogranuloma venereum
Trauma
Impalement
Foreign body
Surgery
Episiotomy
Hemorrhoidectomy
Prostatectomy
Malignancy
Carcinoma
Leukemia
Lymphoma
Radiation

- Predisposing factors for abscess formation are diarrhea and trauma from hard stool.
- Associated factors may be anal fissures, infection of a hematoma, or Crohn's disease.

Classification

- Abscesses are classified by their location within the potential anorectal spaces (Figs. 13.1 and 13.2).

Evaluation

Symptoms

- Anorectal pain, swelling, and fever.
- Gluteal pain may accompany a supralelevator abscess.
- An intersphincteric or supralelevator abscess may produce severe rectal pain with urinary symptoms (dysuria, retention, inability to void).

Physical Exam

- On inspection, erythema, swelling, and possible fluctuation may be seen.
- Digital exam may not be possible due to extreme pain.

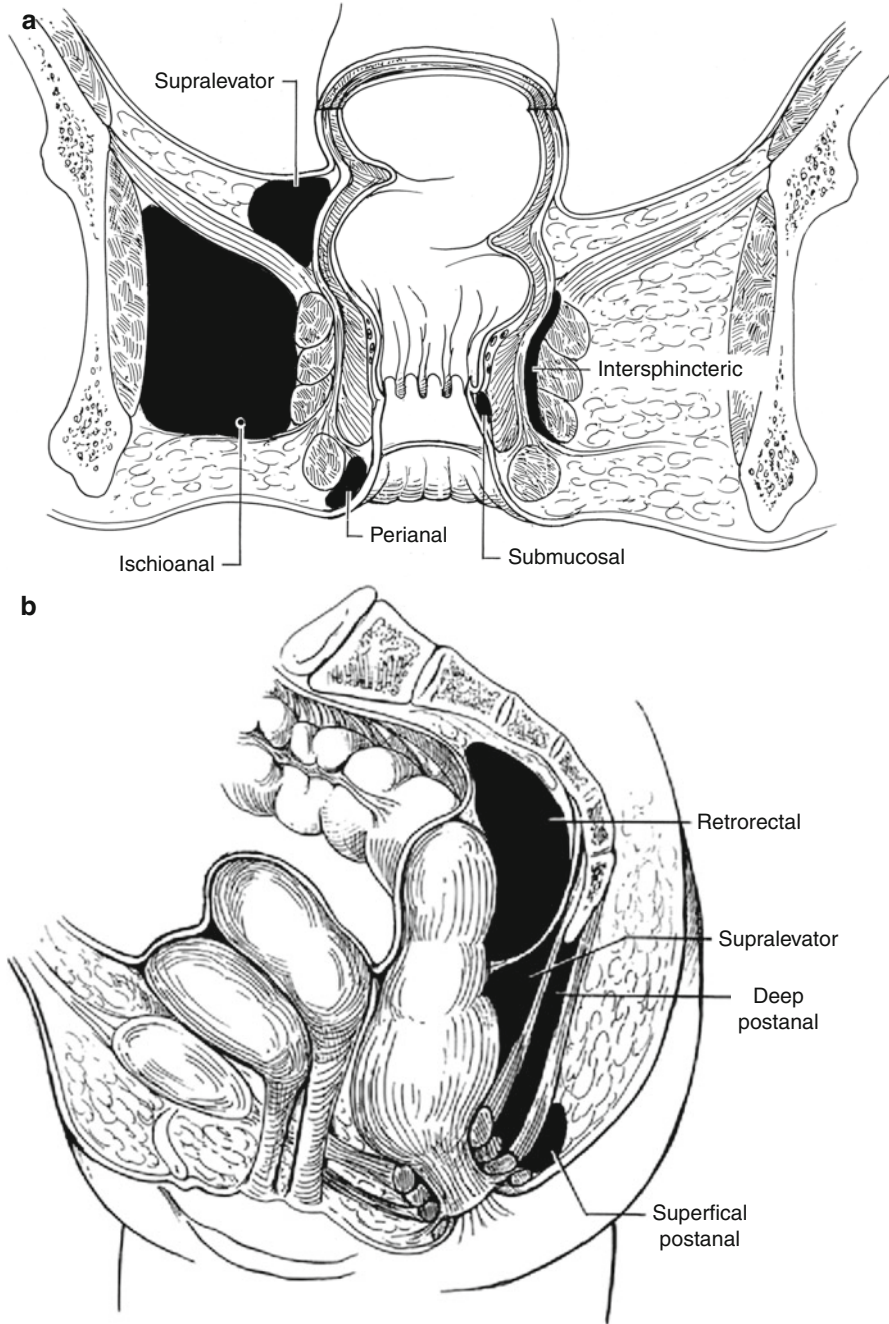


Fig. 13.1 Anorectal spaces: (a) Coronal section. (b) Sagittal section

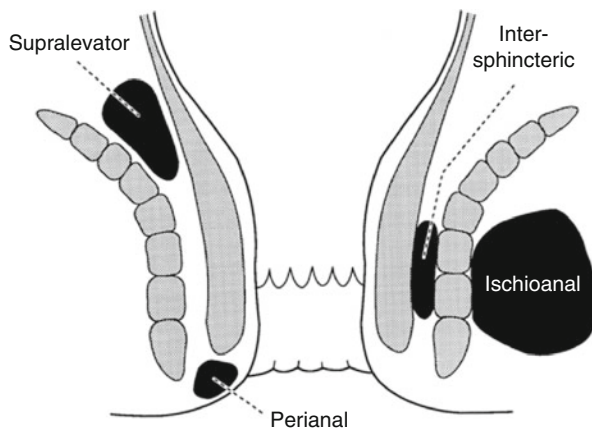


Fig. 13.2 Classification of anorectal abscess

- Anoscopy and proctoscopy are avoided in the acute setting.
- There may be no visible external manifestations despite severe rectal pain with an intersphincteric or supralelevator abscess. If palpation is possible, a mass may be appreciated.
- With a supralelevator abscess, a tender mass may be palpated on rectal or vaginal exam.

Treatment

General Principles

- The treatment of an anorectal abscess is prompt incision and drainage.
- Watchful waiting with antibiotics is ineffective and may lead to a more complicated abscess with sphincter mechanism damage.
- Delay in treatment may lead to a life-threatening necrotizing infection and death.

Operative Management

Incision and Drainage

- A *perianal abscess* may be drained with local anesthesia. A cruciate or elliptical incision is made over the point of maximal tenderness and the edges trimmed to prevent premature closing (which could lead to recurrence). No packing is required.
- Most *ischioanal abscesses* can be drained similarly to a perianal abscess, but the location of the incision should be shifted medial toward the anal side of the abscess but lateral to the external sphincter muscle (this minimizes the complexity if a fistula develops). Large abscesses or horseshoe

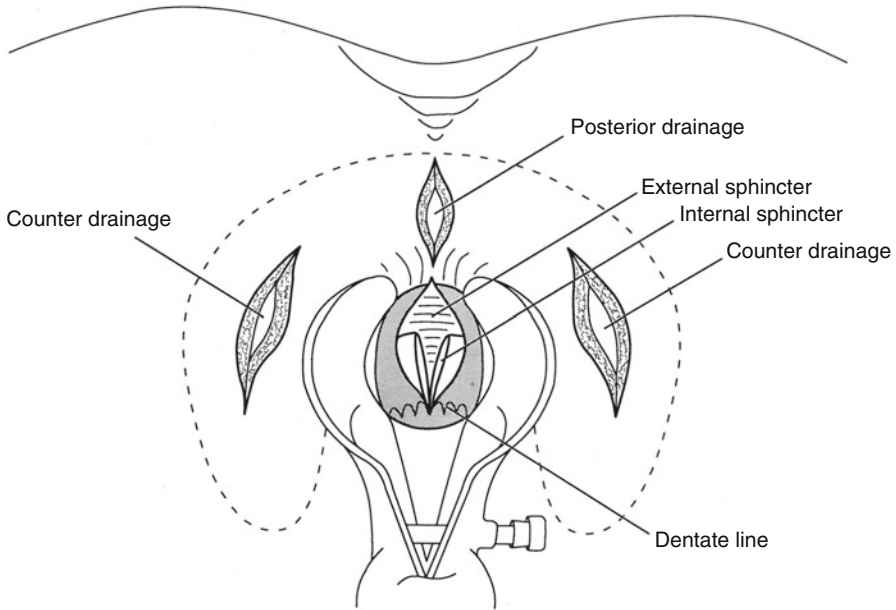


Fig. 13.3 Drainage of a horseshoe abscess

abscesses (with the infection usually originating from the deep postanal space) often require drainage with regional or general anesthesia in the prone or left lateral position.

- For a *horseshoe abscess*, a midline incision between the anus and coccyx is made and the superficial external sphincter muscle fibers are spread to enter the deep postanal space. Counter-incisions are made over each ischioanal fossa to allow drainage of the anterior extensions (Hanley procedure). The distal half of the internal sphincter may be divided to drain the gland where the infection originated (Fig. 13.3).
- For pain out of proportion to physical findings, an exam under anesthesia is mandatory. An *intersphincteric abscess* may be established by palpation of a mass or aspiration of pus in the operating room. The treatment is division of the internal anal sphincter along the length of the abscess. The wound may be marsupialized for adequate drainage.
- A *supralelevator abscess* may result from an upward extension of an intersphincteric or ischioanal abscess or downward extension of a pelvic abscess. If the origin is from an intersphincteric abscess, drainage is accomplished through the rectum by dividing the internal sphincter (not through the ischioanal fossa as that would result in a suprasphincteric fistula). If the origin is an ischioanal abscess, this is drained through the perianal skin (not through the rectum as that would lead to an extrasphincteric fistula) (Fig. 13.4). If the abscess is of pelvic origin, it can be drained via the area it is pointing: through the rectum, ischioanal fossa, or percutaneously via the abdominal wall.

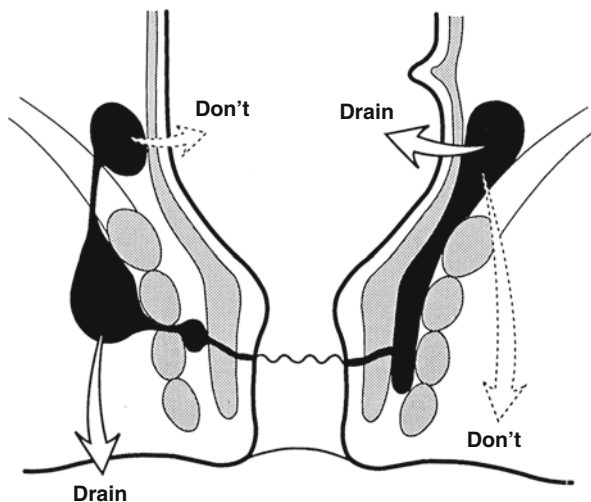


Fig. 13.4 Drainage of a supralelevator abscess

Catheter Drainage

- The area of maximal tenderness is prepped and the skin around it is infiltrated with local anesthesia (injecting at the maximal point of fluctuation may preclude the local anesthesia working in that acid environment).
- A stab incision is made as close to the external sphincter muscle as possible so the tract is as short as possible in case a fistula develops.
- A 10–16 French soft mushroom catheter is inserted over a probe into the cavity. It typically does not need to be sutured in place.
- The catheter is shortened to 2–3 cm outside the skin with the tip in the depth of the abscess (Fig. 13.5a, b).
- The length of time that the catheter is left to drain the abscess cavity depends on the size of the abscess cavity, amount of granulation tissue around the catheter, and character and amount of drainage. If in doubt, it is better to leave it longer.

Primary Fistulotomy

- Primary fistulotomy at the time of abscess drainage is controversial.
- A meta-analysis showed that when the fistula is identified, drainage plus primary fistulotomy decreased the rate of subsequent fistula formation (by 83 %) with no increase in incontinence.
- Against primary fistulotomy:
 - Difficulty in finding the internal opening (as high as 66 % of the time of abscess drainage) can lead to creation of a false passage and neglect to find the main source of infection.

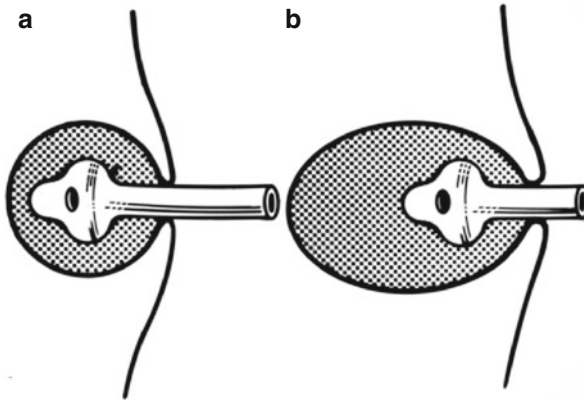


Fig. 13.5 Catheter in an abscess cavity: **(a)** The correct size and length of catheter. The size of the catheter should correspond to the size of the cavity. **(b)** When a catheter is too short. A catheter that is too short or too small could fall into the wound

- Thirty-four to fifty percent of patients with first time abscess formation will not develop a fistula after drainage.
- The search for an internal opening converts a procedure that can be done under local anesthesia (drainage) to one that requires regional or general anesthesia.
- Those younger than 40 years old have a significantly higher risk of developing a fistula or recurrent abscess after initial drainage of a perianal abscess.
- Abscess recurrence is more often observed after drainage of an ischioanal abscess.
- If the internal opening of a low transsphincteric fistula is readily apparent at the time of abscess drainage, primary fistulotomy is feasible EXCEPT in patients with Crohn's disease, acquired immune deficiency syndrome (AIDS), advanced age, high transsphincteric fistula, and an anterior fistula (in women).

Antibiotics

- Antibiotics are only used as an adjunct for patients with valvular heart disease, prosthetic heart valves, extensive soft tissue cellulitis, prosthetic devices, diabetes, immunosuppression, or systemic sepsis.

Postoperative Care

- Postoperatively, patients are instructed to take a regular diet, bulk-forming agents, the prescribed analgesia, and sitz baths.
- Follow-up for patients is generally 2–4 weeks after the procedure, but those with an intersphincteric or supralelevator abscess may be seen sooner at about 2 weeks.

- If catheter drainage has been done, these patients are seen about 7–10 days after catheter placement. If the cavity has closed around the catheter and the drainage ceased, the catheter is removed. Otherwise, the catheter is left in place or a smaller catheter placed.
- In all cases, patients are observed until complete healing occurs.

Complications

Recurrence

- Up to 89 % of patients after drainage of an ischioanal or intersphincteric abscess will develop a recurrent abscess or fistula.
- Recurrence is higher in those who had a previous abscess drained.
- Recurrence of anorectal infections may be due to missed infections in adjacent anatomic spaces, presence of an undiagnosed fistula or abscess at the initial drainage, or failure to completely drain the initial abscess.

Extra-anal Causes

- Extra-anal etiologies that can lead to abscess recurrence include hidradenitis suppurativa, pilonidal abscess (with downward extension), Crohn's disease, tuberculosis, human immunodeficiency virus (HIV) infection, perianal actinomycosis, rectal duplication, lymphogranuloma venereum, trauma, foreign bodies, and perforated rectal carcinoma.

Incontinence

- Iatrogenic injury can lead to incontinence, which occurs with division of external sphincter muscle during drainage of a perianal or deep postanal space abscess (in a patient with borderline continence) or division of puborectalis muscle in a patient with a supralelevator abscess.
- Prolonged packing of an abscess cavity may impair continence by leading to excessive scar formation.
- Primary fistulotomy at the time of initial abscess drainage may lead to continence disturbances while unnecessarily dividing sphincter muscle.

Special Considerations

Necrotizing Anorectal Infections

- Rarely, necrotizing anorectal infections may occur and could result in death.
- Factors associated with this are delay in diagnosis and management, virulence of the organism, bacteremia, metastatic infections, underlying medical disorders (diabetes, blood dyscrasias, heart disease, chronic renal failure, hemorrhoids, previous abscess, or fistula), obesity, and cigarette smoking.

Symptoms and Signs

There are two types of presentation.

- Group one: This group demonstrates superficial infection of the surrounding tissue including necrosis of the skin, subcutaneous tissue, fascia, and/or muscle. A black spot on the skin may occur early. Perianal crepitation, erythema, skin induration, blistering, or gangrene may be present.
- Group two: This group presents with sepsis that involves the preperitoneal or retroperitoneal spaces. The signs may be subtle such as abdominal wall induration, tenderness, or a vague mass. Fever, tachycardia, and vascular volume depletion may precede appearance of an overt infection. CT scan is an excellent diagnostic tool (it will demonstrate origin and extent of infection).

Treatment

- Early recognition, aggressive surgical debridement, and appropriate antibiotic administration are the most important factors to improve outcome and reduce mortality.
- Vigorous resuscitation with invasive monitoring and respiratory and renal support is aggressively carried out (and treated).
- Antibiotics effective against Staphylococci, Streptococci, gram-negative coliforms, Pseudomonas, Bacteroides, and Clostridium are administered intravenously. If a gram stain shows gram-positive rods, penicillin G (24–30 million units per day) and an aminoglycoside are given.
 - Tetanus toxoid is administered.
 - The goals of surgical debridement are to radically remove all nonviable tissue back to healthy tissue, halt infection progression, and alleviate systemic toxicity.
 - The skin changes may not reflect the severity of the liquefactive necrosis of the subcutaneous tissue and extensive necrosis of the underlying fascia. Reexamination under anesthesia is usually necessary to fully evaluate wounds for further debridement.
 - Vacuum-assisted closure may be helpful for healing these wounds, which may be quite extensive.
 - Colostomy is controversial, but should be considered if the sphincter muscle is grossly infected, the patient is incontinent, there is colonic or rectal perforation, or the patient is immunocompromised. A “medical colostomy” using enteral or parenteral nutrition has also been used.
 - Suprapubic urinary diversion is controversial and considered in the presence of a known urethral stricture or urinary extravasation with phlegmon.

- Hyperbaric oxygen therapy (with 100 % oxygen via mask or endotracheal tube at 3ATM for 2 h over 1–2 treatments in patients *without* chronic obstructive pulmonary disease) has been advocated for patients with diffuse spreading infections and then also to promote wound healing. This does not eliminate the mandate for wide debridement of ischemic tissue.
- High rates of mortality due to anorectal sepsis are related to extent of disease and the patient's metabolic status at presentation. Mortality is two to three times higher in diabetics, the elderly, and patients with delayed treatment.

Anal Infection and Hematologic Diseases

- There is a relationship between the number of circulating granulocytes and the incidence of perianal infections in patients with hematologic diseases (most occurred with fewer than 500 neutrophils per cubic millimeter).
- The risk of developing anorectal infections is related to severity and duration of neutropenia.
- The most important prognostic factor is the number of neutropenic days during the infectious episode.
- Presenting symptoms commonly are fever preceding pain and urinary retention. Early signs are point anal tenderness and poorly demarcated induration. External swelling and fluctuation often appear late.
- A neutropenic patient with perianal pain is assumed to have an acute anorectal infection and started on precautionary measures (no digital exams, suppositories, or enemas), sitz baths, stool softeners, bulk agents, analgesia, and antibiotics.
- The most common bacteria are *Escherichia coli* and group D streptococcus. Appropriate antibiotic coverage could be a third-generation cephalosporin with an additional drug for anaerobic coverage or extended spectrum penicillin, an aminoglycoside, and an antianaerobic covering drug.
- Surgical intervention is controversial. Incision and drainage may produce scant or no pus and may lead to hemorrhage, poor wound healing, or an expanding soft tissue infection.
- Surgery has been recommended if there is obvious fluctuation, progression of the soft tissue infection, or persistent sepsis after a trial of antibiotic therapy.
- With fewer than 500 neutrophils per cubic millimeter, low-dose radiation therapy (300–400 rads for 1–2 days) has been suggested. Conflicting successful results have been published with this approach.

Anorectal Sepsis in the HIV-Positive Patient

- With incision or catheter drainage of an anal abscess in an HIV-positive patient, due to being immunocompromised, adjunctive antibiotics should also be given.

- Attempts should be directed at keeping the wounds small due to the potential to have poor wound healing.
- Serious septic complications are rare and may be associated with in situ neoplasia.

Fistula-in-Ano

Pathophysiology

Etiology

- A fistula-in-ano is an abnormal tract or cavity communicating with the rectum or anal canal by an identifiable internal opening. Most fistulas arise from a cryptoglandular infection.

Classification

- Table 13.3 and Fig. 13.6 describe the classification of fistula-in-ano.

Intersphincteric Fistula-in-Ano

- An intersphincteric fistula results from a perianal abscess and the tract passes in the intersphincteric space.
- This is the most common fistula type (70 %).

Table 13.3 Classification of fistula-in-ano

Intersphincteric
Simple low tract
High blind tract
High tract with rectal opening
Rectal opening without perineal opening
Extrarectal extension
Secondary to pelvic disease
Transsphincteric
Uncomplicated
High blind tract
Suprasphincteric
Uncomplicated
High blind tract
Extrasphincteric
Secondary to anal fistula
Secondary to trauma
Secondary to anorectal disease
Secondary to pelvic inflammation

Adapted from Parks (1961)

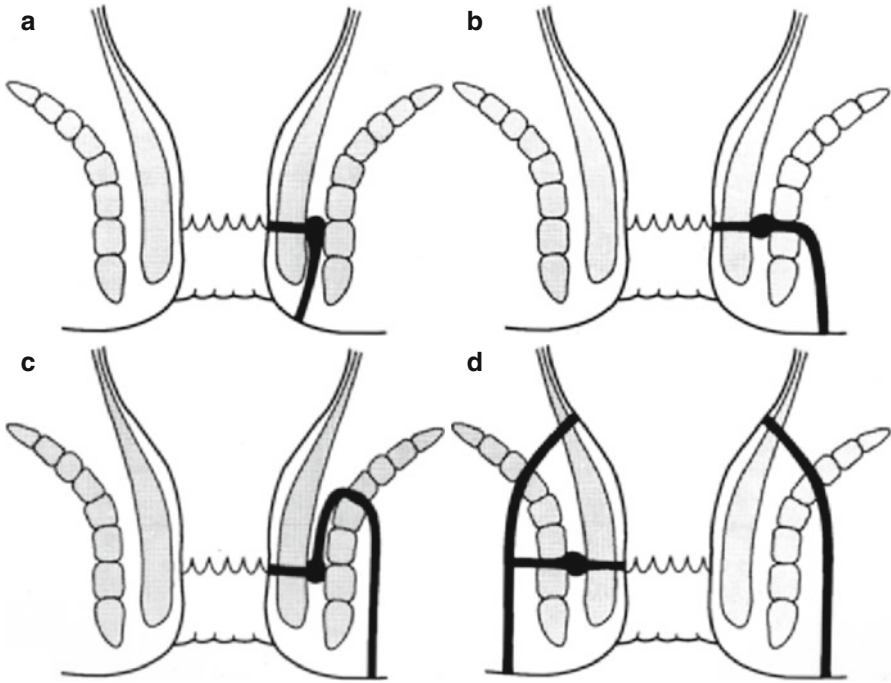


Fig. 13.6 Classification of fistula-in-ano: (a) intersphincteric, (b) transsphincteric, (c) suprasphincteric, and (d) extrasphincteric

- A tract can end blindly in the intersphincteric space, pass cephalad and end blindly, or pass cephalad into the lower rectum.
- There is no downward extension to the anal margin.
- Rarely, an intersphincteric infection can tract cephalad into the pelvic cavity (above the levator muscle) or may originate as a pelvic abscess and manifest itself distally into the perianal area.

Transsphincteric Fistula-in-Ano

- Twenty-three percent are transsphincteric fistula associated with an ischioanal abscess where an infection from the internal opening passes through the internal and external sphincter into the ischioanal fossa.
- This type of fistula could have a high blind tract that passes through the levator ani muscle into the pelvis.
- A rectovaginal fistula (discussed in Chap. 14) is a form of transsphincteric fistula.

Suprasphincteric Fistula-in-Ano

- Five percent of suprasphincteric fistula-in-ano are from a supralelevator abscess.

- The tract starts as an intersphincteric abscess and passes above the puborectalis and then curves downward and lateral to the external sphincter in the ischioanal space and ends at the perianal skin.
- A high blind tract may result in a horseshoe extension.

Extrasphincteric Fistula-in-Ano

- The rarest form of fistula (2 %).
- The tract originates in the rectum and passes above and through the levators, then through the ischioanal space, and exits at the perianal skin.
- The etiology of this fistula may be from a foreign body penetrating the rectum, a penetrating injury to the perineum, Crohn's disease, or carcinoma (or its treatment).
- Another common cause is an iatrogenic injury from vigorous probing during fistula surgery.

Evaluation

Symptoms

- Most patients with a fistula-in-ano recall an abscess (that was incised or drained spontaneously). They may also have continual drainage, pain with defecation, bleeding (if there is granulation tissue at the internal opening), or a decrease in their swelling/pain when spontaneous drainage occurs.
- Bowel symptoms may be present if the fistula results from Crohn's disease, actinomycosis, or anorectal carcinoma.
- Systemic diseases like HIV, carcinoma, or lymphoma should also be considered.

Physical Examination

- The number and location of external openings may be helpful to locate the primary opening (Goodsall's rule, Fig. 13.7). This rule is highly accurate for posterior fistulas and less accurate with anterior fistula (especially in women).
- On digital exam, the internal opening may feel like a nodule or pit. An indurated cord-like structure may be palpable beneath the skin oriented toward the direction of the internal opening.
- Posterior or lateral induration may reflect a deep postanal space or horseshoe fistula.
- Digital exam also should note any relation of the tract to the sphincter muscle, along with the bulk, tone, and voluntary squeeze of the anal sphincter muscle.

Investigations

- Prior to operative intervention, anoscopy may identify an internal opening. Proctoscopy can exclude underlying proctitis or neoplasia.

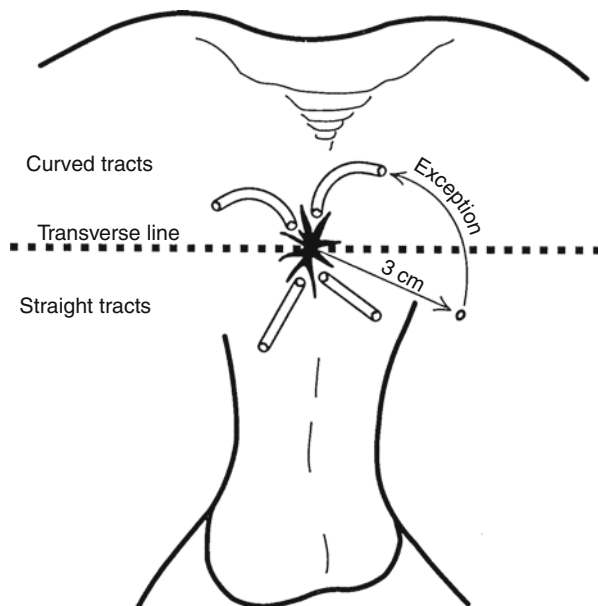


Fig. 13.7 Goodsall's rule: An opening seen posterior to a line drawn transversely across the perineum originates from an internal opening in the posterior midline. An anterior external opening typically originates in the nearby crypt. Generally, the greater the distance from the anal margin, the greater the probability of a complicated upward extension

- Colonoscopy (or barium enema) and small bowel evaluation (as a small bowel series, CT enterography, or MRI enterography) are indicated if there are multiple fistulas, recurrent fistula, or bowel symptoms suggestive of inflammatory bowel disease.
- Anal manometry may be useful in planning the operative approach in a patient with a history of obstetrical trauma (in women), advanced age, Crohn's disease, AIDS, or recurrent fistula.
- Preoperative imaging is strategically used to decrease recurrence rates after fistula surgery by demonstrating clinically undetected sepsis, guide surgery, and determine the relationship of the fistula to the sphincters.

Fistulography

- Cannulation of the external opening and injection of a water-soluble contrast into the fistula tract are considered when the anatomy may be altered such as in recurrent fistulas or in Crohn's disease.
- Accuracy is variable and reported to be between 16 and 96 %. This test may not demonstrate secondary tracts, distinguish an abscess located in the high ischioanal fossa versus supralelevator space, or fail to precisely show the internal opening.
- One study found that fistulography altered surgical management or revealed other pathology 48 % of the time.

Computed Tomography Scan

- A CT scan performed with IV and rectal contrast may distinguish an abscess from cellulitis. It may assess the degree of rectal inflammation in inflammatory bowel disease. It may not visualize fistula tracts in relation to the levators.

Endoanal Ultrasound

- Establishes the relation of the primary tract to the anal sphincters, determines simple from complex fistula, determines the primary internal opening, and assesses the adequacy of drainage.
- An enhancing agent such as hydrogen peroxide injected into the tract at the time of endosonography improves accuracy.
- This study is operator dependant and scars or defects from previous sepsis or surgery impede ultrasonographic interpretation.

Magnetic Resonance Imaging

- MRI is valued to assess complex fistulas particularly in patients with anatomic distortion from previous surgery.
- An MRI is felt by some to be the most accurate technique to delineate the internal opening along with showing the course of primary and secondary extensions.

Treatment

General Principles

- The surgical principles are to eliminate the fistula, prevent recurrence, and preserve sphincter function. This is done by finding the internal opening and dividing the least amount of sphincter muscle.
- Steps to identify the internal opening are:
 - Passage of a probe from the external to the internal opening (or vice versa).
 - Injection of dye (dilute methylene blue, milk, or hydrogen peroxide) in the external opening and noting its presence at the dentate line.
 - Following the granulation tissue in the fistula tract while incising over the extrasphincteric component of the tract.
 - Placing traction on the tract and noting puckering in the anal crypt associated with its internal opening. This maneuver is less successful for complicated fistula.

Operative Management

Lay-Open Technique

- For a simple intersphincteric or low transsphincteric fistula (while typically in the prone position), gently passing a probe from the external opening through the internal opening and incising the overlying tissue can be done (Fig. 13.8).
- No packing is required if adequate unroofing is accomplished.

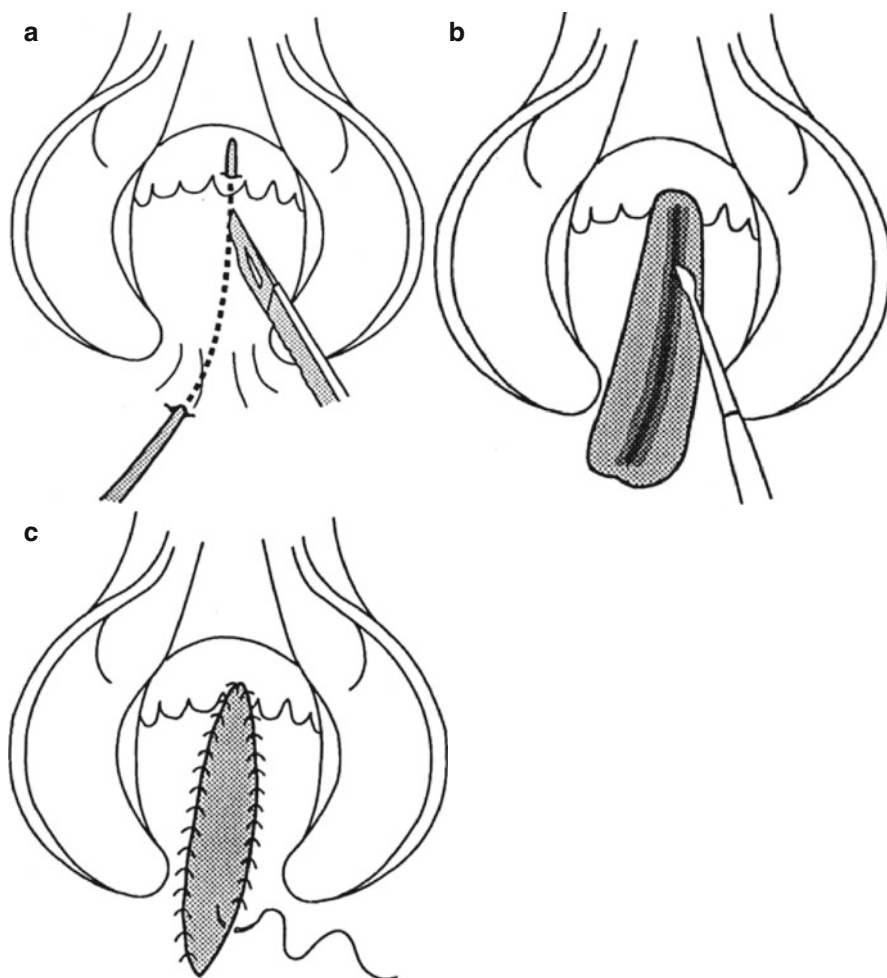


Fig. 13.8 Technique of laying-open: (a) The insertion of probe from the external opening to the internal opening at the dentate line. The tissue over the probe is then incised. (b) Curettage of granulation tissue which may be sent to pathology. (c) Marsupialization of wound edges

Seton

- When the tract transverses a high and significant amount of sphincter muscle, a combination of the lay-open technique with a seton insertion may be chosen in an effort to preserve anal incontinence.
- The seton may be from silk or other nonabsorbable sutures, a Penrose drain, rubber bands, vessel loops, or Silastic catheters.
- The distal internal sphincter along with the skin leading up to the external opening is incised (Fig. 13.9).
- For a cutting seton, the seton is threaded through the tract and tied with multiple knots to create a handle. At regular intervals, the seton is tightened. The seton slowly cuts through the muscle and the proximal sphincter that it cuts through heals with fibrosis. This, in theory, prevents separation and retraction of the sphincter muscle. If it does not totally cut through the external sphincter, the seton allows delineation of the remaining external sphincter muscle, so at a second procedure 8 weeks later, the remaining external sphincter muscle may be divided.
- A cutting seton is preferred for treatment of low transsphincteric fistula, but its use in higher transsphincteric fistula risks fecal incontinence.
- The seton may also be tied loosely and left as a draining seton.
- Indications for placement of a loose seton include to:
 1. Identify and promote fibrosis around a complex anal fistula that encircles most or all of the sphincter mechanism.
 2. Mark the site of a transsphincteric fistula where massive anorectal sepsis has distorted anatomic landmarks.

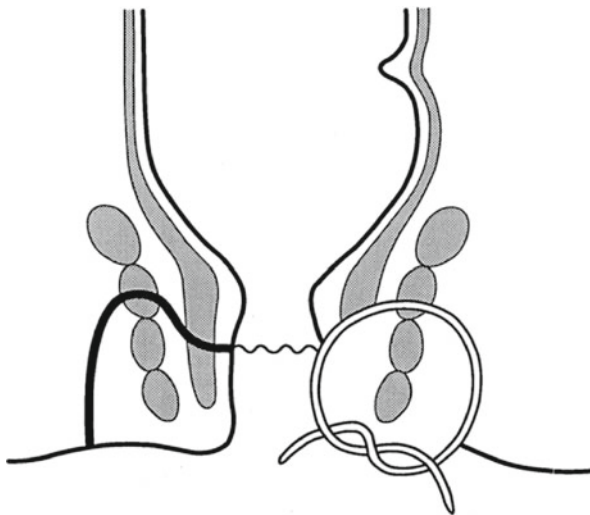


Fig. 13.9 Technique of seton placement

3. Drain an anterior high transsphincteric fistula in a woman (anteriorly, the puborectalis is absent and this leads to a tenuous external sphincter where a fistulotomy may result in incontinence).
 4. Drain a high transsphincteric fistula in a patient with AIDS where healing may be poor.
 5. Avoid premature skin closure, prevent recurrent abscess, and promote long-term drainage in a patient with Crohn's disease.
 6. Provide drainage when there is concern that primary fistulotomy may result in incontinence (i.e., patients with multiple simultaneous fistulas, multiple prior sphincter operations, and the elderly with a weakened sphincter).
- Suprasphincteric fistulas involve the entire sphincter and puborectalis muscle. To avoid laying-open the entire sphincter, one proposed method of seton treatment involves division of the distal internal sphincter muscle and the superficial portion of the external sphincter muscle up to the external opening. A seton is placed around the remaining external sphincter muscle. The wound is allowed to heal and the seton is removed. A variation of this technique is to divide the internal sphincter and perform a partial fistulotomy, unroofing only the skin from the external opening to the level of the external sphincter without dividing any of the external sphincter. The external sphincter is encircled with a seton to promote fibrosis and drainage and removed when the wound is healed. Complete healing with the latter technique has been reported in about two third of patients.
 - Treatment of a deep postanal space suprasphincteric fistula starts with adequate draining of the postanal space as previously discussed and outlined in Fig. 13.3. The horseshoe extensions are enlarged for counter drainage and granulation tissue is curetted. The seton is placed around the posterior muscle for drainage. Since the initial drainage involves division of a portion of the internal sphincter muscle, when all wounds are healed, the seton may be removed.
 - The treatment of an extrasphincteric fistula depends on its etiology.
 - If the internal opening is at the anal crypt, the fistula is felt to be iatrogenic from extensive probing of a transsphincteric fistula. The lower portion of the internal sphincter is divided and the rectal opening is closed with nonabsorbable sutures. A temporary colostomy (or a "medical colostomy") may be needed for healing.
 - If the cause of the fistula was due to a foreign body, this must be removed and drainage established. The internal opening is closed and a temporary colostomy established.
 - If this type of fistula results from Crohn's disease, drainage may be aided by a seton placement. Addressing the anorectal mucosa with medical treatment may be needed.
 - Another etiology of an extrasphincteric fistula is downward tracking of a pelvic abscess, which requires drainage for the fistula to heal.

Flaps

- *Dermal island flaps* have been advocated for fistula treatment as they do not divide muscle. There is a 23 % failure rate typically in males, patients with previous treatments for their fistula, large fistula requiring combined flaps, and those where simultaneous fibrin glue was used with the flap.
- *Anorectal advancement flaps* are considered for anterior fistula in women, select patients with inflammatory bowel disease, a high transsphincteric fistula, suprasphincteric fistula, patients with previous multiple sphincter operations, and complex fistula.
- Advantages of this technique include reduced healing time, reduced discomfort, lack of deformity to the anal canal, and reduced potential for additional sphincter damage (Fig. 13.10a–d).
- Factors associated with poor healing include Crohn’s disease, steroid use, and cigarette smoking.

Fistulectomy

- Not recommended as it creates large wounds and has a greater risk of injuring the anal sphincter muscle.

Fibrin Glue

- Associated with a low incontinence rate as well as a disappointing low long-term cure rate.

Anal Fistula Plug

- A bioprosthetic plug made from lyophilized porcine intestinal submucosa or synthetic scaffold has been used to treat complex anal fistula.
- The implant is colonized by host tissue cells and blood vessels to provide a scaffold for infiltration of a patient’s own connective tissue.
- Indications for an anal fistula plug are:
 1. A transsphincteric fistula
 2. An intersphincteric fistula if there is concern that fistulotomy will lead to incontinence
 3. An extrasphincteric fistula
- Contraindications for plug use include:
 1. Fistula with a persistent abscess cavity
 2. Fistula with ongoing infection
 3. An allergy to porcine products
 4. An inability to identify internal and external openings
- Technique for placement of an anal fistula plug.
 1. Following a full bowel preparation or enema and a single dose of IV antibiotics, the patient is placed in the prone position.
 2. The internal and external opening must be clearly delineated. The tract is neither debrided nor curetted out.

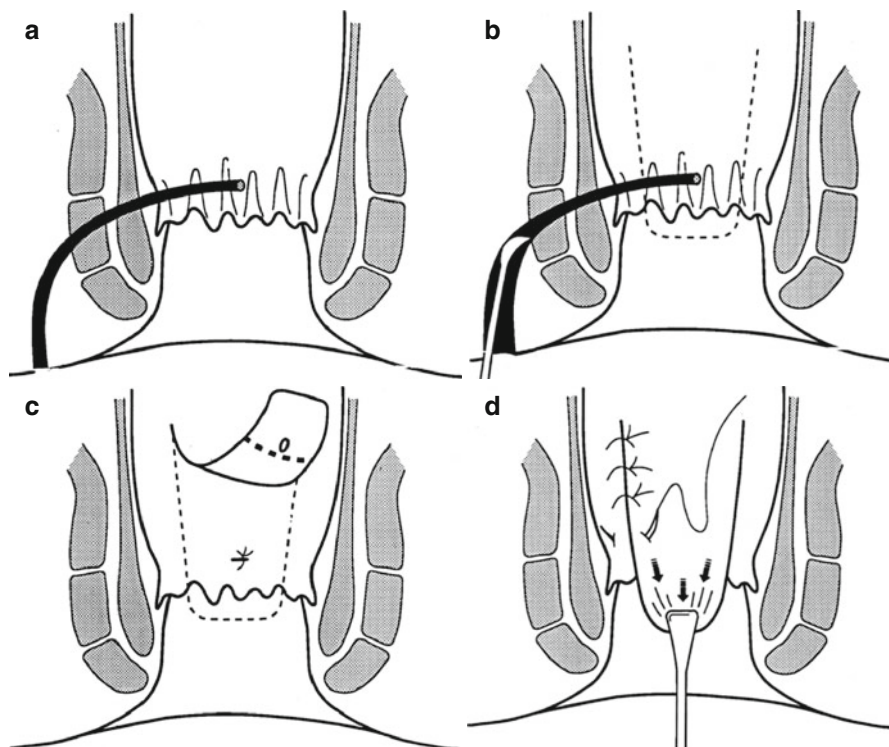


Fig. 13.10 Technique of the anorectal advancement flap: (a) After a full mechanical bowel preparation, antibiotics are administered and a Foley is placed. The surgery is done in the prone or left lateral position under regional or general anesthesia. The fistula tract is identified with a probe and curetted or cored out. (b) The external opening is enlarged to allow drainage. (c) A full-thickness flap of rectal mucosa, submucosa, and part of the internal sphincter muscle is raised. The base of the flap should be twice the width of the apex to maintain adequate blood flow. (A full thickness of the rectal wall may improve successful closure.) The residual internal opening is closed with absorbable suture. The flap is advanced 1 cm below the internal opening. The tip of the flap with the fistula opening is excised. (d) The flap is sewn in place with absorbable suture

3. The plug is immersed in sterile saline for 2 min for rehydration.
4. A fistula probe is placed through the tract and this allows a suture to be then threaded through the tract. The tapered end of the plug is secured to the suture and pulled from the internal opening out the external opening until wrinkling of the external layer of the plug is detected.
5. The excess plug is transected at the primary opening. Using a 2-0 absorbable suture in a figure-of-8 fashion, a generous portion of the sphincter mechanism is sutured to the plug. Any plug protruding at the external opening is trimmed. The external opening is left open for drainage.

6. The patient is advised to avoid vigorous activity for 2 weeks to avoid displacement of the plug.
 7. There are no dietary restrictions.
 8. Topical antibiotics are not recommended.
- Despite its simplicity and avoidance of sphincter muscle division, this procedure has tempered enthusiasm due to variable success rates (14–87 %).
 - Dislodgement and sepsis requiring drainage are possible complications of treatment with the fistula plug.

Ligation of the Intersphincteric Fistula Tract Procedure (LIFT)

- This treatment relies on closure of the internal opening and removal of the intersphincteric tract. A patient with an early abscess is not appropriate until an intersphincteric tract is well formed.
 - Technique of LIFT (patients have a mechanical bowel preparation and are placed in the prone or left lateral position).
 1. The internal opening is identified.
 2. A 1.5–2.0 cm curvilinear incision is made at the intersphincteric groove overlying the fistula tract.
 3. Cautery is used to dissect in the intersphincteric plane while avoiding cutting internal sphincter or breaching the anal mucosa.
 4. The intersphincteric tract is ligated next to the internal opening with 2-0 or 3-0 absorbable suture and the tract next to the suture is ligated.
 5. Probing or injecting the external opening confirms tract division.
 6. The granulation tissue is curetted.
 7. Via the intersphincteric wound, the part of the tract leading to the external opening is sutured.
 8. The incision is closed with 3-0 absorbable suture.
- Postoperatively, wounds are cleaned with tap water twice daily and following defecation.
- Patients are given two weeks of oral ciprofloxacin and metronidazole.
- Problems with the LIFT procedure include difficulty exposing a high fistula tract (especially with a horseshoe tract) and potential damage to the internal sphincter during dissection.
- Success rates are reported to be 58–94 %.

New Biologic Injectables

- Use of human acellular dermal matrix (as a plug of dermis without cellular components) and a suspension of Permacol™ (a cross-linked porcine dermal collagen matrix) have been trialed by injecting them into the fistula tract. These remain to be evaluated in large trials.

Postoperative Care

- Following the lay-open technique, patients eat a regular diet, use bulk agents, and are given analgesic medication.
- Frequent sitz baths ensure perianal hygiene.
- Patients are seen at 2-week intervals to ensure healing is from the bottom up. Silver nitrate sticks may be used to cauterize granulation tissue and assess the depth of the wound.
- One strategy of care after the advancement flap is to remove the Foley on postoperative day 1 and discharge when a diet is tolerated.

Complications

Incontinence

- Continence problems after fistulotomy are related to the complexity of the fistula, the location of the internal opening, preexisting sphincter damage, and the amount of muscle divided.
- Patients with complicated fistulas, high openings, posterior openings, and fistula extensions are at a higher risk of incontinence.
- If the edges of the fistulotomy wound do not precisely approximate, the anus may be unable to properly close and result in intermittent leakage of gas and stool.
- Impaired incontinence after fistula treatment has been associated with increasing age and female gender.
- After treatment with a seton, minor incontinence was reported in 39–73 %. Placing a seton and later removing it without dividing any muscle reduced this to 17 % in one series.
- Major fecal incontinence using the seton approach was reported in 6.7 %.
- Decreased resting and squeeze pressures have been noted in some patients after a fistulotomy.
- Nine to thirty-five percent have disturbed continence with an advancement flap. This has been attributed to overstretching the anal sphincter by retractor placement and disruption of internal fibers with flap development. Decreased resting pressures have been noted in some patients after an advancement flap.

It is important to recognize preexisting sphincter defects prior to embarking on fistula surgery.

Recurrence

- A 0–18 % recurrence rate is found after fistulotomy. Recurrence has been associated with failure to identify the primary internal opening (due to a circuitous tract, spontaneous closure of the internal opening, or a microscopic internal opening) or to recognize lateral or upward fistula extensions.

- Diligent postoperative care is needed to avoid premature closure of the external component of the fistulotomy wound which can lead to recurrence.
- Long-term recurrence after an advancement flap is about 40 % typically associated with necrosis and flap retraction. A full-thickness rectal flap may assist in preventing ischemic necrosis of the flap.
- Early postoperative complications after fistula surgery include urinary retention, hemorrhage, fecal impaction, and thrombosed external hemorrhoids.
- Late complications include pain, bleeding, pruritus, and poor wound healing.
- Anal stenosis and mucosal prolapse have also been reported.

Special Considerations

Crohn's Disease

- Anal fistula may be the most challenging Crohn's disease manifestation to manage.
- The location of Crohn's disease in the bowel affects frequency of fistula occurrence. Those with rectal disease have the highest fistula incidence.
- A full evaluation of the small and large bowel is done to determine the extent of disease.
- Since many Crohn's-related fistulas are complex, delineation of the fistula tract is important.
- Endoanal ultrasound and MRI have been helpful for evaluation. MRI may detect unsuspected abscesses and determine the relationship of the fistula tract to the sphincter muscles.
- Surgical management of Crohn's fistula may lead to poor and delayed wound healing along with possible sphincter injury.
- A conservative approach has been advocated with antibiotics (metronidazole and ciprofloxacin) and immunomodulators (corticosteroids, 6-mercaptopurine [MP], azathioprine, and infliximab [or other anti-TNF alpha medications]).
- Treatment with 6-MP and infliximab may prolong the effect of infliximab for fistula closure. Seton placement with infusion of infliximab and then maintenance with azathioprine or methotrexate has been reported to result in complete healing in 67 %. Initial therapy should be aimed at addressing rectal inflammation with topical or oral treatment.
- Primary fistulotomy at the time of abscess drainage is not advocated.
- Asymptomatic fistula requires no treatment.
- For low fistula with simple tracts and no active proctitis, the lay-open technique has been successfully used. However, delayed healing may be seen.
- Factors associated with delayed healing are rectal involvement, anorectal complications (like stricture), and the presence or absence of an internal opening.

- Fecal incontinence has been reported even in patients after drainage of an abscess and with no division of sphincter muscle. This is speculated to be from a noncompliant rectum or diarrhea. Caution at division of any sphincter muscle in these patients is advised.
- For complex high fistula, (prolonged) seton drainage to limit suppuration and preserve anal sphincter function has been advocated.
- Rectal advancement flaps have successfully been used in patients without severe rectal disease. A covering stoma may be considered in these patients, particularly if they have undergone multiple unsuccessful repairs, but does not guarantee success.
- Quiescent intestinal disease has been suggested to improve outcome for Crohn's fistula surgery but has not been conclusively proven.
- Fecal diversion provides temporary improvement in anal fistula disease, but restoration of the fecal stream leads to reactivation of the fistula.
- Fibrin glue and the fistula plug have been variably successful to close Crohn's anal fistula.
- Mesenchymal adipose stem cells have been successfully used to stimulate fistula closure.
- For severe intractable disease, an intersphincteric proctectomy may ultimately become necessary.

Fistula-in-Ano in the HIV-Positive Patient

- Anoreceptive HIV-positive individuals have frequent anal fistula which may begin at the dentate line but end in a blind sinus tract.
- Concern for wound healing has led to caution with surgical intervention.
- Asymptomatic fistulas require no treatment.
- A low CD4+ count may be associated with poor wound healing.
- A 5-day course of preoperative antibiotics has been advocated due to a high risk of infectious complications.
- Care is taken to avoid creation of a large wound and to avoid division of significant sphincter muscle.
- For low fistula in patients who are good operative risks, fistulotomy may be appropriate. An indwelling seton should be considered for patients who are poor operative risks or have a high or complex fistula.
- Metastatic abscesses have been reported in patients with asymptomatic perianal fistula.

Mucinous Adenocarcinoma Arising from a Fistula-in-Ano

- Long-standing fistula-in-ano with chronic inflammatory changes has been associated with the development of carcinoma arising in the fistula tract. This is extremely rare.
- Diagnostic criteria include that the fistula antedates the carcinoma by 10 years, the only tumor should be directly from the carcinoma in the fistula

tract, and the internal opening should be in the anal canal and not into the tumor itself.

- Early diagnosis is difficult.
- MRI is helpful and may show pools of extracellular mucin lined by columns of malignant cells, cords, and vessels which produce a mesh-like structure and the presence of a fistula between the mass and the anus.
- Treatment is abdominoperineal resection, but recent successful treatment with chemoradiation with abdominoperineal resection reserved as a salvage procedure has been reported.

Rectourethral Fistulas

Pathophysiology

- The prostatic urethra is the most common site of rectourethral fistula.
- These may occur following open, laparoscopic, or robotic prostatectomy; radiation treatment for prostate cancer; trauma; perineal abscess from cryptoglandular origin or Crohn's disease; or following radiofrequency treatment for benign prostatic hypertrophy.

Evaluation

Symptoms

- The most common symptoms are urine leakage via the rectum, pneumaturia, fecaluria, or recurrent urinary tract infections resistant to antibiotics.

Investigations

- For patients with a history of prostate cancer, a PSA should be done and recurrence ruled out.
- A digital exam and proctoscopy can visualize the rectal opening and rule out rectal pathology as the source.
- Cystoscopy and retrograde urethral cystography are performed to rule out a urethral stricture.
- Assessment of urinary continence is also done prior to repair.

Operative Treatment

- Operative repair is difficult due to the limited exposure and the first attempt at repair is felt to be the best as subsequent repairs are more difficult.
- Small fistulas, due to rectal injury during laparoscopic or robotic surgery, should be repaired at the time of injury, but persistent fistula may be managed with an indwelling Foley catheter.

- Urethral defects from radiation that are felt to be too large to repair may be treated with a colostomy or ileostomy and urinary diversion (such as suprapubic catheterization). This type of treatment has been associated with recurrent sepsis and persistent symptoms.

Transabdominal Approach

- A transabdominal repair combines a pull-through of bowel with an omental interposition. Closure of the urethral defect may be difficult in the male pelvis.
- A fenestrated splinting catheter covered with omentum has been used when the prostatic defect must be left open.
- Complications associated with this approach include impotence and urethral stricture.

Perineal Approach

- Interposition using the gracilis muscle, dartos, or Martius flap has been described. A rotational flap using the gracilis is the most popular.
- Important principles for this repair include excision of the fistula, development of layers on the urinary and rectal sides of the fistula, and closure or nonoverlapping suture lines with interposition of the levators (when possible).
- The gracilis provides a well-vascularized interface between the urethra and rectum.
- Ninety-seven to hundred percent successful rates of closure have been reported.
- Complications include urinary retention, stricture, and complications associated with the muscle harvest.

Anterior Transanorectal Approach

- Making a midline perineal incision and dividing all structures superficial to the prostatic capsule allow better access to repair the membranoprostatic fistula. This approach is reported to preserve continence and erectile function.

Paranal Approach

- Advancement of full-thickness anterior rectal wall with a diverting colostomy has been reported to successfully close the fistula in 83 % of cases.
- This approach provides limited exposure, but also has minimal scarring and fewer wound infections. Also, future interventions are not compromised if they are needed.
- This approach works best for rectourethral fistula from iatrogenic causes or trauma as opposed to Crohn's disease.

Kraske Laterosacral Approach

- The disadvantages of this approach including excising two to three sacral segments, with nerves, muscles, and ligaments, make this treatment unattractive.

York Mason (Transsphincteric) Approach

- This approach affords excellent exposure and allows complete separation of the urinary and fecal openings. It avoids damage to neurovascular bundles and pelvic floor structures that maintain continence and sexual function.
- It may be performed with a diverting or “medical” colostomy.
- This approach is associated with longer operative times and more postoperative pain.

Transanal Endoscopic Microsurgery

- This specialized technique allows meticulous two-layer closure of the rectal wall.
- Limited experience has been reported using this approach.

Cystectomy and Ileal Conduit

- For patients with a low probability of successful fistula closure or known urinary continence issues, cystectomy and ileal conduit may be the best therapeutic choice.

Reference

Parks AG. Pathogenesis and treatment of fistula-in-ano. *Br Med J.* 1961;1(1):763–769.