PILONALD DISEASE

John L. Rombeau, MD, Kimberly J. Hwa, MMS, PA-C, and George P. Yang, MD, PhD

Despite having been described nearly 200 years ago, pilonidal disease (PD) continues to produce considerable morbidity and loss of work productivity, and the optimal treatment remains elusive. Surgeons must choose among numerous operative and nonoperative options that overlap and often confound therapeutic strategies.

This chapter provides an overview of PD with an emphasis on operative treatments. Every attempt is made to guide selection of the best treatment for the specific variant of disease. Treatment recommendations are based on today’s greater use of outpatient surgery and the details of perioperative care essential to treating patients with disease. Readers are referred to a brief review of this topic written by one of us (J.L.R.) and the evidence-based discussion and treatment recommendations recently published by the American Society of Colon and Rectal Surgeons (ASCRS) Standards Committee.3

Background/Incidence

PD is a subcutaneous infection originating in the gluteal cleft. The term originates from the Latin pilus (hair) and nidus (nest)—thus, “nest of hair.” It is often mistakenly described as pilonidal cystic disease; however, the primary disease cavities are not epithelialized.

Herbert Mayo is credited for first describing this disease in 1833,1 and Hodges coined the term in 1880.4 Buie highlighted its prevalence in male military jeep drivers and characterized it as “jeep seat disease.”5 PD was particularly notable during World War II, when an estimated 80,000 soldiers became afflicted and lost significant time from active duty.5 It is especially prevalent in Middle Eastern countries such as Turkey.

PD is estimated to affect 26 per 100,000 persons in the United States, occurring predominantly in young adults with a 3 to 4:1 male to female prevalence.6 The risk factors for developing PD are shown in Table 1[see Table 1]. Although male gender is the most prevalent factor, many patients have more than one predisposing trait, which can include family history, local trauma, thick, stiff hair, sedentary occupation, and obesity. Additional contributory causes include horseback riding, cycling, tight clothing, heat, and excessive perspiration. These conditions presumably initiate or potentiate blocking of a hair follicle with ensuing infection and abscess formation. It is also hypothesized that continued exercise such as walking predisposes to hair being pulled into the abscess cavity.7

Pathogenesis

The cause of PD was initially thought to be congenital due to failure of fusion of the dorsal midline, resulting in the entrapment of hair follicles in the sacrococcygeal region; however, more recent information strongly supports an acquired origin based on several observations. PD has been reported to occur between the fingers of sheep shearers, dog groomers, cow milkers, and barbers.8 Further evidence of an acquired origin is supported by the observations of Bascom and Bascom, who discovered that hair follicles in the gluteal cleft became infected with keratin, resulting in local infection and abscess formation.9 They further noted that local suction dynamics in the intergluteal cleft predispose to hairs entering the infected pit and lodging in an abscess cavity.

Karydakis hypothesized as to the origin of PD based on experience with more than 6,000 patients in Turkey.9 He theorized that loose hairs insert into relatively normal tissue and produce a foreign-body reaction. This process in turn creates secondary pits, which occur from the subcutaneous burrowing of hair from the primary pits. Thus, a cycle emerges wherein the invading hairs into the primary pit predispose to both the continuance and the expansion of disease. Karydakis devised a formula to further explain the pathogenesis of PD based on three primary variables: the loose hair or “invader” (H) applies some force (F) (which is influenced by secondary factors such as depth, narrowness, and friction of the natal cleft to create an insertion process) and vulnerability (V), which refers to the local skin and subcutaneous tissues:

Pilonidal disease = Hair (H) × Force (F) × Vulnerability (V)

In Karydakis’s model, the primary sinuses signify the sites for hair entry and the secondary sinuses represent exit points.10 Characteristics common to both the Bascom and Bascom and Karydakis hypotheses include the adverse effects of a deep, moist natal cleft, which helps create a hypoxic milieu predisposing to surgical complications—thus, the importance of an off-midline closure.

Pathology

As mentioned, pilonidal cavities are not true cysts because of the lack of an epithelial lining; however, the fibrous sinus tracts, emanating from the intergluteal cleft, may be epithelialized. Most of the sinus tracts extend either cephalad or laterally. Less frequently, they may extend very close to the anal verge, thus confounding operative treatment and creating significant challenges for complete eradication of

<table>
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<tr>
<th>Table 1 Risk Factors for Developing Pilonidal Disease</th>
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<tr>
<td>Male gender24,41</td>
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<tr>
<td>Hirsute43</td>
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<tr>
<td>Body mass index &gt; 2544</td>
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<tr>
<td>Positive family history34</td>
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<tr>
<td>Irregular bathing (frequency of bathing &lt; 2–3 times per week)42,43</td>
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<tr>
<td>Prolonged sitting (&gt; 4–6 hr per day)42,43</td>
</tr>
<tr>
<td>Prolonged driving (&gt; 4 hr per day)43</td>
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<td>Sacrococcygeal subcutaneous fat thickness43</td>
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disease. Surprisingly, hair follicles per se are infrequent on histologic examination; however, cavities may contain gross hair, debris, and granulation tissue. The local cellular infiltrate often is large and contains foreign-body giant cells in association with hair.\textsuperscript{11}

**Clinical Presentation and Diagnosis**

Clinical presentation is variable and consists of the history and physical findings of both acute and chronic disease, including various stages of transition between these two phases.

The prototypical patient is a young, hirsute male who complains of pain, swelling, and drainage in and around the intergluteal cleft. Physical findings vary from a small dimple to a large painful mass. With the use of a handheld mirror, patients may note lateral draining tracts with erythema and swelling. Hair may be visible protruding from the site of disease.

The diagnosis is usually determined from the patient’s history coupled with the aforementioned findings on the physical examination of intergluteal swelling, tenderness, and drainage. Special studies such as pelvic computed tomography (CT) and magnetic resonance imaging (MRI) are seldom helpful.

Hidradenitis suppurativa is the most frequent condition simulating PD. This condition differs from PD as to the following: a history of previous infections in addition to physical findings in the axilla, groin, and perineum rather than the intergluteal cleft. Additional differential diagnoses include anorectal cryptoglandular fistula or abscess extending into the natal cleft, Crohn disease, perianal fistula, and infectious processes such as tuberculosis, syphilis, and actinomycosis.\textsuperscript{12} To rule out other diseases, a careful perianal inspection, digital rectal examination, and proctoscopy should be performed when the patient is able to tolerate such evaluations. Although the disease may present in various stages of complexity, it is arbitrarily categorized as acute or chronic for purposes of diagnosis and treatment.

**ACUTE PILONIDAL DISEASE**

Acute disease presents with swelling, erythema, and localized tenderness, similar to acute subcutaneous infections in other parts of the body. These patients may present initially with minimally inflamed sinus pits with extruding hairs and associated drainage. Patients often minimize or discount these findings until the disease evolves into an abscess. An acute pilonidal abscess may be extremely painful and is exacerbated by sitting and walking. In some instances, the abscess spontaneously bursts, with ensuing drainage and partial resolution of symptoms. Unfortunately, recurrence is frequent. Documented risk factors for recurrence are shown in Table 2 [see Table 2]. In our experience, the cavity size, increased numbers of sinus pits, and obesity are particularly detrimental.

**CHRONIC PILONIDAL ABSCESSES/DRAINING SINUS TRACTS**

Chronic disease usually includes a past history of acute disease superimposed on severe and recurrent symptoms and is characterized by extensive inflammation with multiple draining sinuses and significant involvement of the intergluteal cleft. In many instances, patients have been operated on previously. Patients with chronic disease almost always require more extensive operations when compared with acute disease [see Operative Treatments, below].

**Treatment Strategies**

Every attempt is made to “tailor” the treatment to the extent of the disease. The principles for treatment are shown in Table 3 [see Table 3]. As a result of the prolonged, difficult healing of pilonidal wounds, the least invasive procedure should be performed. The extent of invasiveness of various operations varies from a relatively noninvasive office procedure to a major tissue transposition if the disease is complex. If there is early-onset disease with limited inflammation, nonoperative treatment is both appropriate and efficacious.

**NONOPERATIVE TREATMENTS**

**Shaving**

Shaving of the intergluteal cleft and its surrounding skin is the most effective nonoperative treatment for PD and may be both prophylactic and therapeutic. It is relatively safe, with minimal complications. A 5 cm area around the natal cleft from the anus to the presacrum is shaved. Pits are examined closely using fine-tipped forceps, and visible hairs are removed. The frequency of shaving depends on how quickly the hairs grow back. Although this is usually performed by a surrogate, many patients are too embarrassed to seek help with shaving. An occasional patient will attempt self-treatment, but this is not recommended due to impaired exposure and the potential for skin injury and incomplete removal of hairs.

Shaving of the contiguous skin and the intergluteal cleft results in earlier return to work, fewer total operations, and

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<tr>
<th>Table 2</th>
<th>Risk Factors for Developing Recurrence of Pilonidal Disease</th>
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<tr>
<td>Smoking\textsuperscript{47}</td>
<td>Positive family history\textsuperscript{29,46}</td>
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<td>Age at onset (&lt; 22 yr of age) with positive family history\textsuperscript{25}</td>
<td>Cavity size (≥ 12 mL)\textsuperscript{7}</td>
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<tr>
<td>Number of sinus pits (≥ 3)\textsuperscript{7,45}</td>
<td>Deep and airless cleft\textsuperscript{7}</td>
</tr>
<tr>
<td>Overhanging surgical scar(s)\textsuperscript{2}</td>
<td>Excessive skin excision from previous operation(s)\textsuperscript{3}</td>
</tr>
<tr>
<td>Body mass index &gt; 27\textsuperscript{9,30}</td>
<td>Wound complications\textsuperscript{31}</td>
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<tr>
<th>Table 3</th>
<th>Principles for Treatment of Pilonidal Disease</th>
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<tr>
<td>“Tailor” treatment to severity of disease</td>
<td>Perform least invasive treatment to minimize/eliminate symptoms</td>
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<tr>
<td>Conservatism (overriding guide)—less is more</td>
<td>Minimize incision/excision of intergluteal cleft</td>
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<tr>
<td>Make lateralizing wounds if possible</td>
<td>Create off-midline closure with flap procedures</td>
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<tr>
<td>Implement systematic wound care</td>
<td>Follow closely until wound healed</td>
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less hospital admission days when compared with more invasive surgical procedures. The ASCRS recommends a trial of gluteal cleft shaving in both acute and chronic disease as either primary or supplementary treatment when there is no acute abscess.

A nonrandomized study in more than 300 patients showed that weekly shaving was superior to excision. A weekly 5 cm strip shave in the gluteal cleft and removal of visible hair from pits were performed until healing occurred. Their retrospective review showed a significant reduction in recurrences in excisions and hospital admissions. Abscesses were managed with simple lateral incision and drainage. Recurrence was 40% and was managed solely with repeat shaving. The authors concluded that hair control effectively controlled pilonidal sinus disease and should be preferred over excisions.

A more recent study examined the long-term effects of hair removal on recurrence rates of PD in 504 patients. All patients were advised to shave the gluteal cleft regularly, but only 113 patients followed this advice. Surprisingly, recurrence rates were higher for patients who performed hair removal practices, 30.1% versus 19.7% (p = .01). Additionally, the authors opined that razor shaving could traumatize the skin or cause hairs to grow in the wrong direction.

Despite these findings, when feasible, we recommend shaving as a first-line treatment in the absence of an abscess. This intervention is inexpensive, pain free, low risk, and low cost and can be performed in the outpatient setting.

**Laser Depilation**

Performed most frequently by dermatologists, laser depilation destroys hair follicles by pulses of light. Laser hair removal is not permanent but is more prolonged when compared with shaving and promotes rapid healing of the sinuses in the absence of hairs.

Several studies have examined the use of laser depilation for hair removal in patients with primary or recurrent PD. Laser depilation has similar success rates compared with shaving, but most studies had only a 2-year follow-up. Limitations include short-term posttreatment pain, frequency of treatments, and cost. The ASCRS Standards Committee concluded that there is insufficient evidence to recommend this technique.

**Waxing/Chemical Depilation**

Waxing removes the hair from the root, not the skin surface, for 2 to 8 weeks; however, some patients may notice regrowth as soon as 1 week. It can be used in patients who do not have a surrogate assistant. The limitations include initial discomfort and long-term costs. Despite the absence of confirmatory data, waxing and chemical depilatory agents continue to be used for PD. To our knowledge, waxing has not been carefully studied in PD. Of concern, there have been reports of allergic dermatitis and burns due to waxing of hair in other areas of the body.

Chemical depilatory cream–based agents have been examined and found to be equivalent to razor shaving in the setting of hair removal preoperatively. Some creams contain thioglycolate, which enhances transdermal drug delivery.

**Operative Treatments**

Operative treatments are selected, in part, based on the extent and severity of disease. They may be categorized as to whether the disease is acute or chronic.

**Acute Disease/Abscess**

**Incision and drainage** When a pilonidal abscess does not drain spontaneously, patients usually require incision and drainage. Our treatment approach for acute disease with abscess is shown in Figure 1. We arbitrarily use 5 cm as the differentiating abscess diameter to determine whether the procedure should be performed inside or outside the operating room. If the abscess is greater than 5 cm or recurrent, it may include loculated segments separated by subcutaneous septae. In our experience, these patients are best operated on with manual disruption of loculated cavities in the operating room with the aid of extensive local, regional, or general anesthesia.

There are several principles of incision and drainage of acute pilonidal abscesses that differ from treating localized abscesses in other anatomic locations. As mentioned, if the abscess is less than 5 cm in diameter, incision and drainage is frequently performed in the emergency department, clinic, or office. Local anesthesia is used. If available, a proctoscopic table aids exposure in a mild prone jackknife position. A portable high-powered light source markedly improves visualization. To enhance exposure, the buttocks are taped to each side of the table with tincture of benzoin applied on the skin prior to the tape. Local anesthesia (1% lidocaine) is applied through a #25 needle starting just lateral to the prominent segment of the abscess. An off-midline cruciate incision is made. This facilitates lateral drainage of the wound, minimizes surgical trauma to the intergluteal cleft, and reduces the risk of recurrent disease.

In the setting of an acute abscess, we generally do not excise concomitant sinus pits, which are often obscured. Regardless of whether an abscess is acute or chronic, ideally, it

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**Figure 1** Operative strategy for acute pilonidal abscess. I&D = incision and drainage.
Operations for chronic disease include “pit picking,” chronic abscess curettage with midline pit excision (Bascom I), incision and unroofing with marsupialization, incision and unroofing with open wound and secondary healing, excision of midline or lateral disease with or without primary closure, cleft lift procedure (Bascom II), Karydakis flap, and more advanced flap procedures.

“Pit picking” Pit picking is the surgical removal of the sinus pit with concomitant removal of hair. The goals of this procedure are to reduce discomfort and prevent disease progression. It is often performed in the office with the aid of local anesthesia. A proctoscopic table providing a mild prone jackknife position enhances exposure. A fine-tipped forceps and a small hemostat facilitate hair removal from the pit. The deep tissues are left intact. If the patient has had recent drainage of an abscess, we generally wait at least 3 weeks before attempting pit picking. Pit picking frequently has to be repeated based on the number of inflamed pits and the severity of infection. Patients are seen frequently for shaving of the contiguous skin.

Chronic abscess curettage with midline pit excision (Bascom I) Bascom developed an operation based on his hypothesis that the hair follicle per se, not the hair shaft, was the source of local sepsis. This procedure minimizes surgical trauma to the intergluteal cleft, thus facilitating wound healing. Wounds are shaved prior to surgery. We perform this procedure in the operating room with the aid of regional or general anesthesia. If the disease is minimal, a short procedure room with local anesthesia is used.

Midline pits are excised conservatively with the aid of a dermatologic punch biopsy instrument (3 to 4 mm) [see Figure 4]. The use of these instruments provides an excellent method to excise the inflamed pit while minimizing the extent of the midline wound. Injection of 10% methylene blue into the wound of the excised pit helps identify possible lateral extensions of disease. A concomitant lateral, cruciate incision with overlying elliptical skin excision, parallel to the midline wound, is made at least 2 cm from the midline; the
Figure 3  Operative strategy for chronic, recurrent pilonidal disease. PRN = as needed.

Incision, unroofing of sinus tracts with marsupialization
This technique is used for multiple, extensive sinus tracts, particularly when they extend close to the anal verge. The roof of the tract is initially incised and then excised conservatively to promote drainage and facilitate packing; the wound is then curetted aggressively with a bone curette. If the sinus tract is chronic, curettings are sent for pathologic examination to rule out concomitant squamous carcinoma. If feasible, one edge of the skin is “marsupialized” to the base of the wound with absorbable suture. If marsupialization is not technically feasible, wounds are left open. Wounds are “saucerized” or “beveled” to aid healing by secondary intention. The wound is packed daily with a wet-to-dry dressing until healed.

The advantages of this technique include ease and shortness of operation and minimal tissue destruction. The disadvantages include prolonged healing and labor-intensive postoperative care.

In a randomized controlled trial (RCT), unroofing and marsupialization provided more clinical benefits and less inconvenience in wound care when compared with rhomboid excision and a Limberg flap.24

Excision of midline/lateral disease without primary closure  This operative approach continues to be used by many surgeons. Its advantages include shortness of operative time and more complete eradication of disease. Its disadvantages include an increased size of the intergluteal wound, prolonged healing, labor-intensive postoperative care, and, if needed, increased difficulty in ensuing flap procedures due to the extent of tissue removal.

Scientific American Surgery
Excision of midline/lateral disease with primary closure
This procedure is used by many general surgeons, but not always appropriately. Excision is performed similarly to the previously described procedure. The decision to close the wound primarily is based on the extent of local infection and perceived tension on the closure. The diseased tissue is sharply excised, and wound closure is performed, if possible, in layers to reduce tension. To further reduce wound tension, the subcutaneous tissue is undermined and the tape on the buttocks is dislodged before tying sutures. Lateral sutures are tied before those placed across the widest component of the wound. Advocates of this approach cite more rapid wound closure when compared with leaving the wound open. Sutures are left in place for 2 weeks. If the wound breaks down, it is treated with packing. The disadvantages of primary closure of larger wounds include increased tension on the wound, more frequent disruption of closure, and significant postoperative pain. For these reasons, we seldom use this technique unless the wound is small (< 3 cm) with minimal contiguous scarring.

A 2010 Cochrane Review of RCTs compared wound healing in PD patients treated with surgical excision with primary closure versus healing by secondary intention. No distinction was made between new (initial presentation of the disease) and recurrent PD. Twenty-six studies (N = 2,530) met the study criteria. Seventeen studies compared open-wound healing with surgical closure. Surprisingly, surgical site infection (SSI) rates did not differ significantly between treatments; recurrence rates were lower in open healing than primary closure (RR 0.06; 95% CI 0.42 to 0.87). Six studies compared surgical midline with off-midline closure.

Healing times were more rapid after off-midline closure (mean difference 5.4 days; 95% CI 2.3 to 8.5). SSIs were significantly higher (RR 3.72; 95% CI 1.86 to 7.42) and recurrence rates were greater after midline closure (Peto OR 4.54; 95% CI 2.30 to 8.96). There was no demonstrable advantage for open healing over surgical closure. A clear benefit was shown for off-midline when compared with midline closure.

Cleft lift procedure (Bascom II) This procedure involves conservative excision of the diseased skin and sinus tracts. A full-thickness skin flap is mobilized across the gluteal cleft to create closure off the midline [see Figure 6]. An important

technical principle is to obliterate (flatten) the intergluteal cleft and make it as level as possible. Marking the skin before the patient’s anesthesia and proper positioning are important to ensure a tension-free closure.

Bascom and Bascom reported complete wound closure with the cleft lift in 30 patients who failed previous operations. There was only one recurrence at 2 years. There was less need for reoperation compared with the lesser Bascom procedure when the cleft lift procedure was investigated in a controlled clinical trial from the United Kingdom. A recent RCT showed that the cleft lift technique provided a better quality of life than the Limberg flap during the early postoperative period.

Karydakis flap  This operation creates an off-midline closure by creating a sliding type of flap with an oblique excision of the PD close to the level of presacral fascia [see Figure 7]. It differs from the cleft lift in that the flap is more extensive and deeper, consisting of subcutaneous fat in addition to skin. Extensive mobilization of the subcutaneous fat is essential to provide a tension-free closure. Remarkably, Karydakis reported less than 1% recurrence in more than 5,000 patients followed over 20 years. The wound complication rate was 9%. In a recent large RCT from Turkey, the Karydakis flap was superior to the Limberg flap with regard to decreased postoperative pain and complications; however, there was no significant difference in recurrence prevention. The Karydakis flap produced greater patient satisfaction and less deep full-thickness wound disruption when compared with the Limberg flap in a recently published RCT.

More advanced (extensive) flap procedures  Advanced flap procedures are more extensive than the previously mentioned flaps and are usually reserved for patients with severe, recurrent, complex disease. These operations may be the only reasonable option for individuals with decreased presacral fat. Flap procedures used for patients in this category include the Limberg flap, the V-Y advancement flap, Z-plasty, and the gluteus maximus myocutaneous flap. A recent editorial cautioned surgeons against performing these procedures unless they have moderate experience with tissue mobilization. At the very least, it is recommended that these operations be performed with the assistance of a plastic surgeon [see Figure 3].

Postoperative management  Postoperative patients require meticulous wound care that is a major determinant of outcome. When appropriate, wet-to-dry dressing changes are applied at least once and, if possible, up to three times daily. Either sitz baths or shower débridement is recommended before repacking. This is soothing and escalates wound healing. If marsupialization
of the wound is performed, sitz baths are delayed by 3 to 4 days postoperatively to lessen the effect on premature breakdown of the suture. Wound care is typically provided by a spouse or partner. If this is not an option, a home visiting nurse or daily visits to a wound care clinic need to be arranged. As discussed, shaving in the postoperative period should be performed after complete wound healing is achieved.

Narcotics are prescribed for about 10 days and are continued depending on the extent of the operation and pain severity. Stool softeners and fiber are given to counter the constipatory effects of the narcotics. Antibiotics are prescribed only if there is evidence of cellulitis. Patients are seen within 3 to 4 weeks postoperatively, and intermittent visits are scheduled until the wound has healed. Patients who have not achieved complete healing should return to clinic every 2 months or as needed for wound follow-up.

Recurrence is the bane of surgery for PD regardless of the operation performed [see Table 4]. It can occur up to 20 years postoperatively; however, 75% are evident within the first 5 years. If the patient has had three or more operations, follow-up should exceed 5 years.36

Additional Treatments

PHENOL INJECTIONS

Phenol is an aromatic alcohol with weak acidic properties. It is corrosive and must be used carefully as it can cause widespread tissue destruction in the injected areas. It is used in PD to burn the diseased tissue and increase scarring to prevent further infection. One or more injections are made directly into the sinus tract following removal of sinus hairs and debris. Protection of the contiguous skin is an important component of this technique.

Phenol has been used successfully to primarily treat chronic PD. Kayaalp and Aydin reviewed studies from 1964 to 2007.36 All studies were either prospective cohort or retrospective. In general, patients with acute abscesses were excluded, but patients with recurrent disease were included. Sixty to 100% of patients had no evidence of recurrence, with an average length of follow-up at 18 months. Kaymakciglu and colleagues found that recurrence was higher with an increasing number of sinus orifices (≥ 3, 6% vs < 3, 38%) and high cavity volumes (≥ 12 mL, 6% vs < 12 mL, 71%).37 Discharge from the sinuses was an expected outcome and decreased over time. The most common complications after phenol treatments were abscess formation and cellulitis (9%). These adverse effects were not observed with application of crystallized phenol.38 The authors concluded that there was minimal time off work, and patients were able to resume daily activities immediately despite long healing times (typically around 3 weeks).39 We have no experience with this procedure. Moreover, due to the lack of randomized studies, safety concerns, and short-term follow-up, evidence for the use of phenol is tenuous; however, short-term results are promising.

FIBRIN GLUE

Fibrin glue has been investigated as a primary and adjunctive treatment to surgery (concurrently with sinotomy, excision without closure, or with flaps).39,40 In the absence of controlled clinical trials, we have not used this approach; however, short-term results are promising.

VACUUM-ASSISTED CLOSURE

Placement of a vacuum-assisted closure (VAC) with negative pressures to wounds often left open to heal by secondary intention decreases wound edema, increases local blood supply, and promotes granulation tissue formation via central force.41,42 The advantages also include less frequent dressing changes. An untoward effect is the presence of a VAC in an uncomfortable anatomic location. A recent randomized prospective study compared VAC therapy with standard wound dressing for PD. Patients treated with VAC therapy healed faster, returned to work sooner, and had similar pain scores compared with the control group being treated with a conventional absorbing dressing.43

Conclusions

Despite its long and storied history, PD continues to be difficult to treat. Conservatism is the overriding treatment principle, with the extent of the operation tailored to the severity of the disease. Every attempt should be made to minimize wounds in the intergluteal cleft and, if indicated, create an off-midline closure. If a major flap procedure is considered for more extensive, recurrent disease, assistance from a plastic surgeon is recommended. Detailed postoperative care is paramount regardless of the operation performed.

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References


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