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Pilonidal disease

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Pilonidal disease is a painful condition usually occurring in the intergluteal region. It is a problem filled with controversial issues, including who actually first described the disease, its etiology, and its optimal treatment.

Pathogenesis

The condition was probably first described by Mayo in 1833 [1]. Hodges in 1880 first used the term "pilonidal," from the Latin pilus, which means hair, and nidus, which means nest [2]. Whether it is an acquired or congenital disease had puzzled physicians since its description. In the early twentieth century, it was studied on an embryological basis and treatment centered on extensive removal of all embryological remnants. During World War II, from 1941 to 1944, 78,924 young people were admitted and treated in Army hospitals with this disease [3]. This led to new, less extensive surgical treatment designed to get young soldiers out of the hospital and allow them to return to active duty. During WW II, the condition was also known as "jeep disease" and was felt to be from sitting for long periods of time in vehicles. This predisposed hair ends to be pushed into neighboring hair follicles and to initiate a "foreign body" reaction. The resulting abscess would rupture. leaving a painful draining sinus [4].

Karydakis states that a 35-year study on thousands of cases of pilonidal disease leaves no doubt as to the true acquired etiology [5]. He describes three factors that are involved in the hair insertion process: (1) the invader, consisting of loose hair; (2) a force that causes hair insertion; and (3) the vulnerability of the skin to the insertion in the depths of the nadal cleft. Loose hair, leading with the root end, collects in the nadal cleft [6]. Friction forces the hair to insert at the depth of the cleft, not at the sides. With the insertion

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of one hair, others can more easily follow, provoking the foreign body reaction and infection of pilonidal disease. Karydakis feels that the primary sinuses are the portals of entry of the hair and the secondary fistulas are the portals of hair exit. Other factors may also be involved to explain the occurrence of the disease in hairless people, however. Work by others, including Bascom [7] and Notaras [8], supports this theory of an acquired condition due mainly from hair trapped beneath the surface.

Presentation

Although usually seen in the sacrococcygeal region, interdigital pilonidal sinus disease has been described in the hands of hairdressers and barbers [9,10], sheep shearers (from the wool) [11,12], milkers (from the cow's hair) [13], dog groomers [14], and a man who worked in a slaughterhouse [15]. Additionally, the disease has been described in the umbilicus [16], chest wall [17], anal canal [18], ear [19], and scalp [20]. In this article, only sacrococcygeal pilonidal disease will be discussed, but its presentation in unusual areas should be considered in patients with a nonhealing wound and appropriate occupations or conditions.

Pilonidal disease occurs predominately in men (80%) [21]. The peak incidence is in those 15 to 24 years of age and it decreases after age 25. It is rare after age 45 [22]. The true incidence is unknown, but in 1973, over 70,000 people were admitted to nongovernment hospitals in the United States with the condition [23]. A Norwegian study estimates an incidence of 25 per 100,000 [23]. All races can develop the disease, but it seems more common in those with dark, stiff hair or auburn hair [22].

Some individuals are asymptomatic with midline pits in the presacral area about 5 cm cephalad from the anus. These pits may never become symptomatic or may have minimal symptoms. Symptomatic disease presents as a painful abscess, usually of short duration. There is erythema and swelling over the sacrococcygeal region. The abscess may spontaneously drain and form a secondary tract, or require an incision and drainage.

More commonly, patients present with chronic draining pilonidal sinus tracts. On examination, an opening is usually seen in the midline nadal cleft. Occasionally there can be multiple sinus tracts and openings. There can be cycle of closure of an opening with acute infection and spontaneous drainage. Loose hair may be seen projecting from the primary orifice. The tracts beneath the skin surface may be extensive and are lined with granulation tissue. With pressure on the tracts, seropurulent fluid may be discharged. If left unattended the tracts may become lined with squamous epithelium.

Treatment

Treatment approaches have become less invasive and aggressive as physicians have accepted an acquired etiology. There are many accepted treat-

ments; unfortunately, none are perfect, and impaired wound healing and recurrence plagues all of them. Factors associated with recurrent pilonidal disease include hair, deep midline gluteal clefts, undebrided devitalized tissue, and suture line tension. Most surgeons would agree that the initial treatment for a pilonidal abscess should be adequate drainage. This can be done under local, regional, or general anesthesia. These cavities are rarely loculated, so an elliptical incision (parallel with but slightly off the midline) with evacuation of pus and hair is sufficient. In some patients this is definitive treatment, especially those over 30 years old, with healing and no further treatment needed in about 50% [24,25]. A logical approach would be to adequately drain pilonidal abscesses and consider additional surgery if a sinus persists after six months [22].

The ideal operation for pilonidal sinus disease should be simple, require short or no hospitalization, and have a low recurrence rate. There should be minimal pain and wound care, rapid return to normal activity, and finally the treatment should be cost effective. With this in mind, many of the numerous treatments will be discussed ,starting with the simplest.

Fistulotomy and curettage

Unroofing all the sinus tracts and converting them to an open wound to heal by secondary intention is the easiest method to deal with chronic pilonidal disease. This also includes unroofing or excision of the pits and secondary external openings. Some practitioners excise (versus unroof) the tracts and many pack the wounds and continue dressing changes to ensure that the edges do not close over prematurely. The advantage of this approach is that it is easy to perform. The disadvantage is that prolonged wound care is needed for closure.

No special preoperative preparation is needed. This procedure can be done with local, regional, or general anesthesia. We prefer the prone jackknife position, but some use the left lateral position. Aggressive shaving of surrounding hair after positioning on the operative table is essential. A probe is inserted into the midline opening and a knife or bovie is used to open the skin superficial to the probe. Secondary tracts are also unroofed. The base is curetted. Beveling or saucerizing the edges of the wound decreases the chance of wound edges closing over prematurely. After hemostasis is obtained, gauze is lightly packed into the wound. Most patients are discharged that day, eating a regular diet and with appropriate analgesia. We do not administer antibiotics. Patients shower daily and usually another person is needed to pack the wound with dry gauze after showering. We think it is essential that the wound be packed lightly and to the base. We prefer to have the dressing changed another time during the day with a normal saline wet-to-dry dressing. Shaving the hair to prevent its accumulation in the wound for 3 cm to 4 cm from the surrounding edges may be the most important aspect of postoperative care.

In four studies using this method, 273 patients were treated, 230 of whom were available for follow-up. Follow-up ranged from three months to 20 years. Time to healing was 27 days to six weeks. Recurrence rates ranged from 1% to 19% [26–29].

Marsupialization

Buie presented his classic paper on "jeep disease" in 1944 [4]. As previously stated, during WWII physicians were looking for a method to treat pilonidal disease that would allow the many soldiers afflicted with the problem to quickly return to active duty. The goal of marsupialization was to create a smaller wound that would heal faster.

Patients are prepared and positioned as described above. The tracts are identified and unroofed as described above. With this technique, excision of the tracts and pits can be done. The wound can be curettaged. The skin edges are sewn to the fibrotic base of the wound (Fig. 1). This minimizes the wound size and prevents premature wound closure. If the sutures pull out prematurely, the wound may return to its original size. Postoperative wound care is similar to the above recommendations. In one series, patients were seen weekly or biweekly and open areas were curetted and debrided to remove excess granulation tissue. Also, premature skin bridges were divided and hair shaved [30]. Patients were advised to use a depilatory agent or have someone shave the natal cleft free of hair for three to six months after healing.

Solla and Rothenberger [30] used this technique on 125 patients with a 6% recurrence rate. The exact length of follow-up was unclear in the article. Time to healing ranged from 3 to 20 weeks (average 4) and 2.4% had a wound breakdown. Those with wound breakdown or recurrence were treated with repeat marsupialization and all healed by 4 more weeks. Two other studies of 79 and 26 patients [31,32] using this technique showed a healing time of 3 to 5 weeks and a recurrence rate of 1% to 4%. Follow-up ranged from one to six years.

Bascom's operation

In 1965 Lord and Millar advocated midline pit excision to treat pilonidal disease [33]. Their premise was that pilonidal sinuses were foreign body sinuses with hair as the foreign body. If the hair is removed and free drainage is provided, the sinus will heal. They also felt that midline pits needed to be removed to allow the sinus to heal. Bascom expanded on this idea and felt that follicles of hair (not shafts of hair) were the source for pilonidal disease. He felt that midline hair follicles enlarge and become infected by forces exerted onto the midline gluteal cleft [34]. Infection of the follicles leads to cysts and sinus tracts. Bascom tailored his treatment to exactly what stage the disease was in at the time of presentation. All procedures were done in the office under local anesthesia. Essentially, chronic abscesses were

Fig. 1. With marsupialization the tracts are identified and unroofed. With this technique, excision (versus unroofing) of the tracts and pits can be done. The wound is curettaged. In an effort to decrease the size of the wound and in turn accelerate wound healing, skin edges are sewn to the fibrotic base of the wound. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

treated by excision of the midline follicles, excising minimal healthy tissue. One to 10 follicles were removed, leaving wounds 2 mm to 4 mm in diameter. Another longer incision one finger breath lateral and parallel to the midline was made. This incision undermined the midline and gauze was pushed through the cavity to ''scrub out'' hair and granulation tissue (Fig. 2). Epithelial tubes (which sound like fistula tracts) were dissected via enlarged lateral incisions, being careful to leave tiny midline wounds. Lateral incisions were left unsutured. Antibiotics were not used unless later cellulitis developed. Wounds were examined weekly and ''picked free of hair.''

In 1983, Bascom reported his results with 161 patients treated with his techniques [7]. He reported a mean follow-up of 3.5 years (the longest was nine years). The mean time to complete healing was three weeks. Sixteen

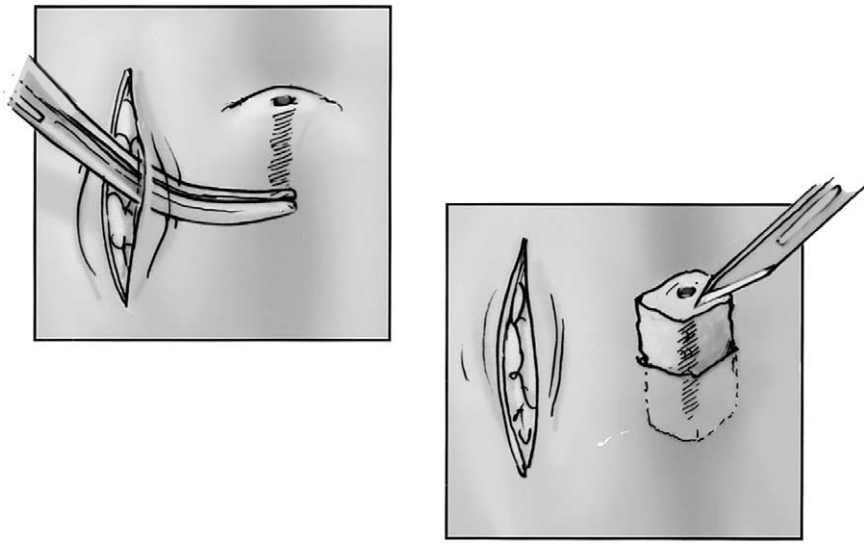

Fig. 2. In the Bascom operation, midline pilonidal pits or follicles are excised. One to 10 follicles can be removed, leaving wounds 2–4 mm in diameter. The sinuses or cavity are opened through an incision 2 cm lateral and parallel to the natal cleft. The lateral incision undermines the midline and gauze is pushed through the cavity to "scrub out" hair and granulation tissue. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

percent had some form of recurrence or nonhealing. More recently, two other studies published their results with this technique. Mosquera and Quayle in 1995 [35] with 41 patients in the ambulatory setting, had a recurrence rate of 7% at 10 months. In this study 22% of the patients had recurrent disease when the Bascom technique was used after other surgical techniques had failed. Senapati in 2000 [36] reported on 218 patients with a follow-up of one year. Their recurrence rate requiring reoperation was 10%. All underwent repeat Bascom procedures with good results.

Excision and primary closure

Excision and primary closure involves excision of the entire sinus with closure of the wound. Small wounds may be addressed in the outpatient setting, but larger wounds may require hospitalization. This procedure has the advantage of avoiding wound packing. One problem is that the incision tends to be situated in a deep midline cleft where there is tension and also the propensity to accumulate hair. Solla and Rothenberger [30] used this method on 9 patients. The average healing time was two weeks (9–28 days) and 22% recurred. Foss [37] reported on a collective series of 1129 patients treated with excision and closure of their pilonidal disease. Failure of primary healing was 16% and recurrence rate was 16%.

In an effort to improve on this technique, Karydakis believed that interruption of hair insertion was key to preventing this disease. In his modification, the midline sinus is excised elliptically and the wound closed off the midline (Fig. 3). A thick flap is created by undercutting the medial wound edge and advancing it across the midline. By doing this, the natal cleft is flattened and the entire suture line is positioned lateral to the midline [5]. Using this method he reported on 7471 patients with a follow-up of 2 to 20 years. The recurrence rate was 0% to 1%.

Kitchen, using the Karydakis procedure, reported on 114 patients, of whom 33 had recurrent disease after a failed previous surgical procedure [38]. The overall recurrence rate was 4% and among those patients who had recurrent disease at presentation, all were cured. Anyanwu et al reported on 28 patients, 12 of whom had previous attempts at surgical cure before presentation [39]. Early complications included four wound infections requiring drainage and one sinus requiring curettage. All wounds eventually underwent complete healing. At 36 months follow-up no recurrences were found. Al-Jaberi [40] used this technique on 46 patients. He found a 4% recurrence rate and a 7% wound breakdown rate. The low recurrence rate may be attributed to the creation of a shallow midline furrow that is free from scar or suture holes and hence less vulnerable to hair penetration than a midline wound.

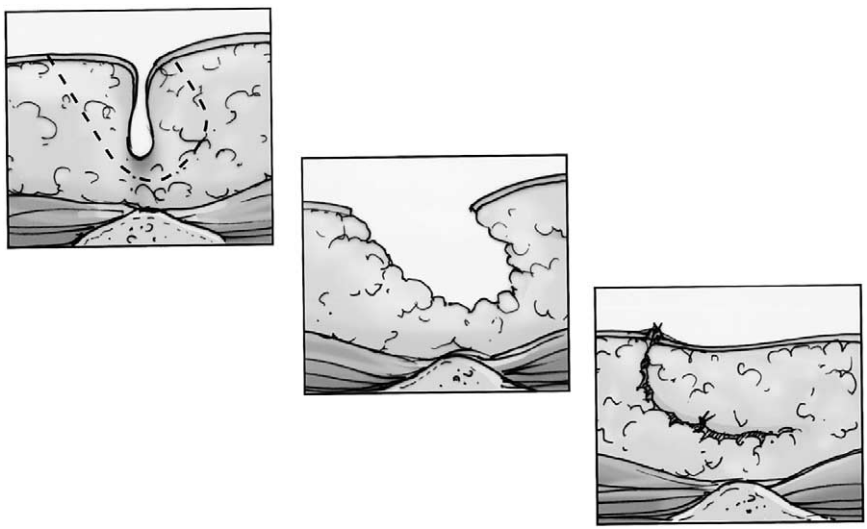

Fig. 3. Excision of the disease and primary closure is one surgical option. In an effort to improve on this technique, Karydakis [5] modified the procedure. The midline sinus is excised elliptically and the wound closed lateral to the midline. To do this, a thick flap is created by undercutting the medial wound edge and advancing it across the midline. By doing this, the natal cleft is flattened and the entire suture line is positioned lateral to the midline. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

Skin grafting

Excision of the disease followed by skin grafting is also an effective method of treatment. Guyuron [21] used this method on 58 patients. 42 had failed an average of 2.2 (0–22) previous surgeries. With an average follow-up of 5 years (1–10), 1 patient had a recurrence. Even though these results were presented in 1983, when longer hospitalizations were acceptable, one drawback of this procedure may be the continued need for extended hospitalization: the average length of hospital stay was 10 days (7–22).

Cleft closure

Inspired by the Karydakis operation, Bascom devised an operation he called cleft closure [41]. The operation differs from the Karydakis one in that fat is not excised and fat mobilization is not required. In this procedure, full thickness skin slaps are raised. The abscess cavity is wiped free of debris. The gluteal fat is allowed to appose. Excess skin is excised from one side, and the wound is closed. This reshapes the cleft, making it shallower, with the suture line displaced out of the fold (Fig. 4). Using this procedure done as a same-day operation, Bascom was able to successfully close open midline wounds in 30 patients that had failed to close for 1 to 20 years after one to

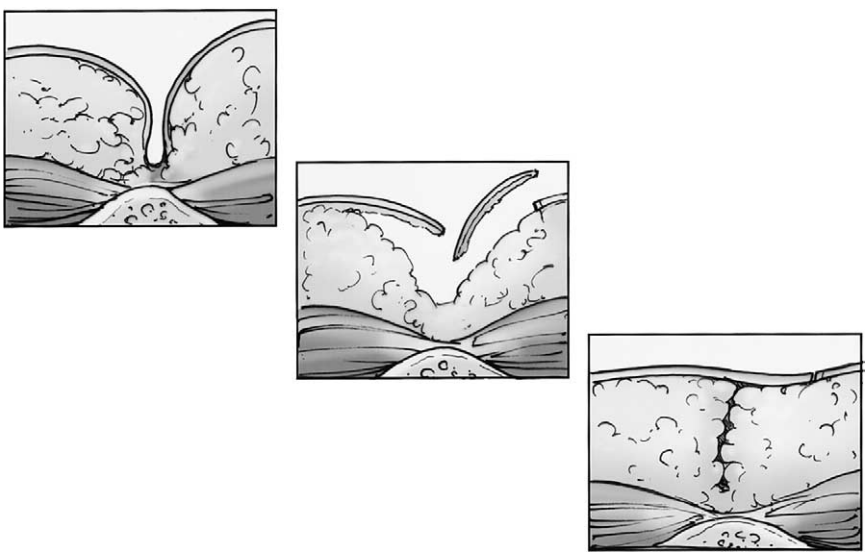

Fig. 4. Bascom devised an operation he called cleft closure [41]. The operation differs in that fat is not excised and fat mobilization is not required. In this procedure, full thickness skin slaps are raised. The abscess cavity is wiped free of debris. The gluteal fat is allowed to appose. Excess skin is excised from one side, and the wound is closed. This reshapes the cleft, making it shallower with the suture line displaced out of the fold. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

six operations on each patient. The median number of disability days was four. Early complications included two wound infections and three problems related to skin necrosis. All wounds eventually healed, but there also was one small pilonidal abscess at two years.

Flap procedures

Flap procedures have several advantages [42]. There is total removal of all sinus tracts and infected cutaneous and subcutaneous tissue. They allow for immediate or delayed tension-free closure using healthy tissue. An asymmetric scar diverts the sulcus from between the buttocks. Numerous flaps are described. Many are common flaps used by plastic surgeons. Several will be discussed.

Z-plasty

Z-plasty obliterates the natal cleft and provides increased transverse length by recruiting lateral tissue. The midline sinus is excised. Limbs of the Z are cut at the ends of the midline wound. Subcutaneous skin flaps are raised down to the level of the fascia and transposed. Finally the skin is closed (Fig. 5). This procedure flattens the gluteal cleft and the flaps recruited laterally provide horizontal length.

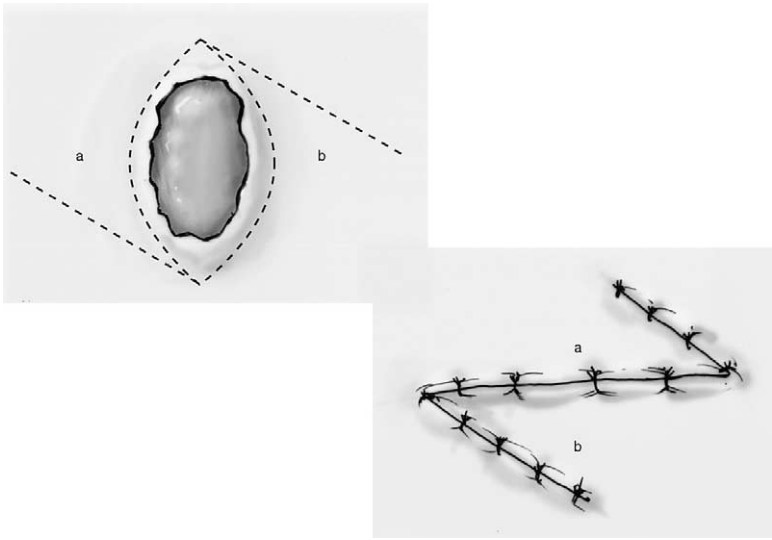

Fig. 5. Z-plasty obliterates the natal cleft and provides increased transverse length by recruiting lateral tissue. The midline sinus is excised. Limbs of the Z are cut at the ends of the midline wound (A,B). Subcutaneous skin flaps are raised down to the level of the fascia and transposed as shown with the limb of the a and b flaps moved into place as shown. Finally the skin is closed. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

Mansoory and Dickson [43] used this technique on 120 patients. Complications included three abscesses and two hematomas. There were only two recurrences (1.6%) at a follow-up of 1 to 9 years. Following surgery, discharge was on the first post operative day and patients returned to work two weeks later. Toubanakis [44] used this procedure on 110 patients. He found no recurrences at follow-up of 1 to 10 years.

V-Y advancement flap

V-Y advancement flaps may be unilateral or bilateral (Fig. 6). A unilateral flap will cover a defect 8 cm to 10 cm in diameter. Bilateral flaps cover defects greater than 10 cm. The flaps are composed of skin, fat, and underlying gluteal fascia. Advantages of this procedure are that it destroys the natal cleft, removes all midline pits and all necrotic tissue, and allows for closure without tension. The medial aspect of the flap can be turned over to eliminate dead space.

Schoeller [45] used unilateral V-Y advancement flaps in 24 patients with recurrent disease after previous surgical intervention had failed. There were two transient wound dehiscences. At an average follow-up of 4.5 years, no recurrences were seen. Dylek [46] used bilateral V-Y flaps on 23 patients, 9 of whom had undergone previous surgical intervention that had failed. All patients were discharged within 10 days. There were four minor

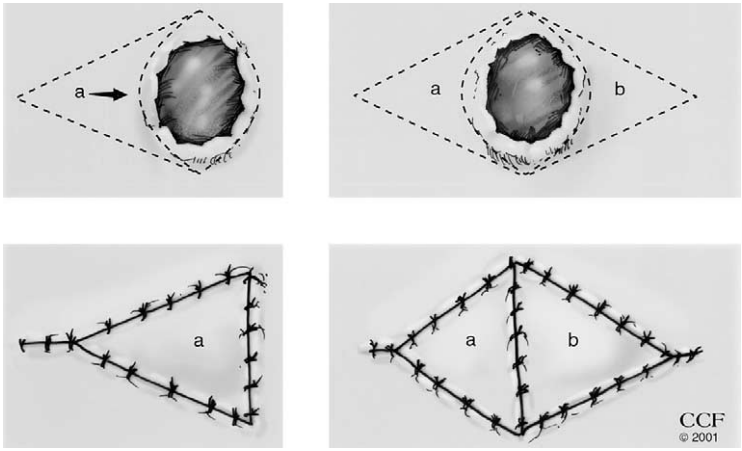

Fig. 6. V-Y advancement flaps may be unilateral or bilateral. The flaps are composed of skin, fat, and underlying gluteal fascia. In the figure, if a unilateral flap is desired, the disease is excised and the flap extended in a V fashion from the wound as marked by a. This is then advanced into the wound and secured. The resulting suture lines resemble a Y on its side because the area of harvest is reapproximated to simulate the stem of the Y. For larger defects, flaps can be created on both sides of the wound (A,B). (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

complications, including seroma in 2 patients and a wound infection in 1. At the mean follow-up of 18 months no recurrences were seen.

Rhomboid flap

The rhomboid flap starts by excising all sinuses down to the presacral fascia using a rhombic incision (Fig. 7). The flap consists of skin and fat and is constructed by extending the incision to the gluteal muscle fascia. The flap is rotated and secured. The advantage of this flap is that it flattens the gluteal cleft with a large, well-vascularized pedicle that can be sutured without tension. Therefore, it will be unlikely to necrose. The recent literature is replete with favorable reports using this flap. The most common complication is a seroma or wound separation. This operation is suitable for cases where simpler operations have failed.

One large recent series on 129 patients was reported by Cubukcu [47]. There was a 5% recurrence rate at an average of two years follow-up. Milito and coworkers treated 67 patients [48]. Of these, 6 had failed previous surgeries. The average hospital stay was 5.3 days. No recurrences occurred after a mean follow-up of 74 months.

Gluteus maximus myocutaneous flap

The gluteus maximus musculocutaneous flap consists of the creation of a large rotational buttock flap (Fig. 8). The procedure permits radical excision

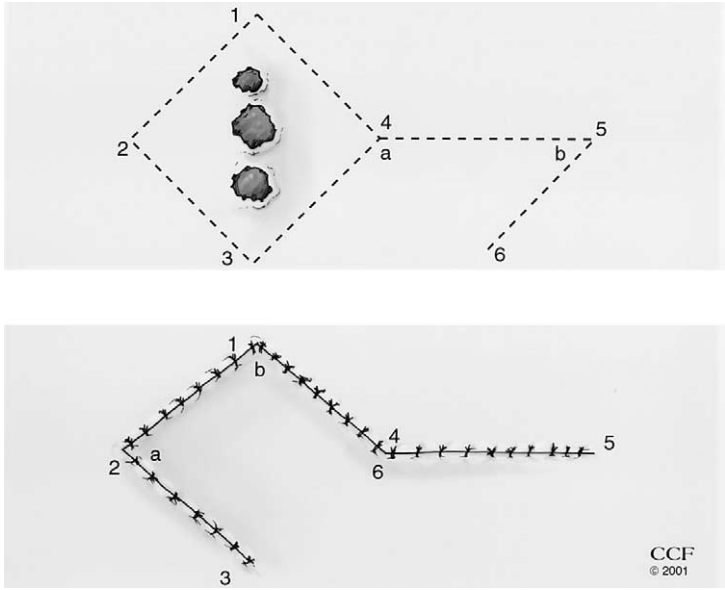

Fig. 7. The rhomboid flap starts by excising all sinuses down to the presacral fascia using a rhombic incision. The flap consists of skin and fat and is constructed by extending the incision to the gluteal muscle fascia. The flap is rotated and secured as depicted in the figure. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

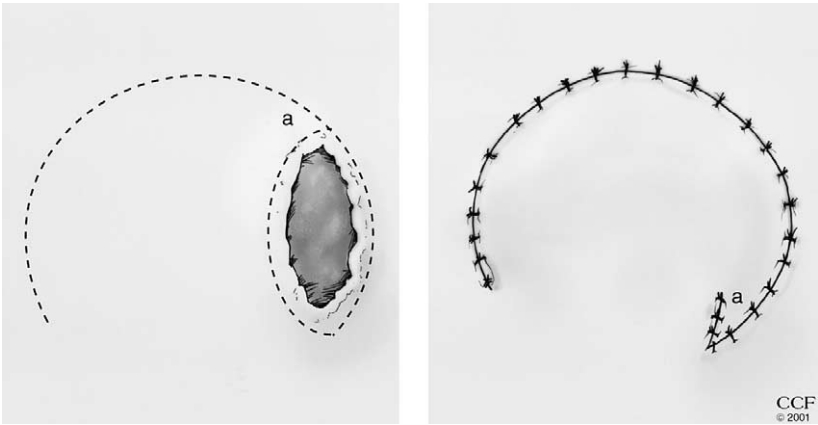

Fig. 8. The gluteus maximus musculocutaneous flap consists of the creation of a large rotational buttock flap. The procedure permits radical excision of all diseased tissue and fills the dead space with bulky, well vascularized, and compliant tissue. Large defects can be covered with this approach. This procedure carries the highest degree of difficulty and potential morbidity of all approaches and is used when other conventional procedures have failed. (*From* the Cleveland Clinic Foundation, Cleveland, Ohio; with permission.)

of all diseased tissue and fills the dead space with bulky, well vascularized, and compliant tissue. Large defects can be covered with this approach. It also allows for suture lines to be created without tension and obliterates the natal cleft, and hence eliminates the local anatomic factors that appear to perpetuate recurrences. On the negative side, musculocutaneous flap procedures are larger operations with long hospitalizations and higher morbidity should wound dehiscence occur. Rosen and Davidson [49] used this approach in five patients with recalcitrant pilonidal disease. All were young males who had suffered with the disease an average of 15 years and had undergone an average of six previous surgical procedures (3–13). All patients were disease free at 40 months. The average hospital stay was 13 days and total time off work was two months. The authors do not recommend this procedure unless most other conventional measures have failed.

The use of drains after closure techniques and flaps

It is difficult to ascertain from the literature what drains are used after any form of excision and closure of pilonidal disease. One of the few efforts to examine this issue was a prospective randomized study on the use of closed suction drains with Limberg flap [50]. The authors found in 40 prospectively randomized patients that early wound complication rate was 7.5% and recurrence rate was 2.5% for both groups. The only difference was that the length of hospital stay was significantly longer in the drainage group. They concluded that drainage was not necessary. Karydakis uses a penrose drain at the upper end of the wound for two or three days [5]. A modifica-

tion of this was the use of a suction drain by Akinci and associates [51]. Because hematomas and seromas are postoperative complications, they have reduced this incidence to zero with the use of suction drains. In a review of the literature, successful closures are found with suction drains (Karydakis procedure [39], rhomboid flap [48,52], Limberg flap [53]). Others also have successful outcomes without the use of drains (Z-plasty flap [43], primary closure [40,54]). The use of drains probably does decrease the incidence of collections under the flap. We do not think that the definitive answer can be derived from the current literature.

Other issues

Methylene blue

It had been traditional to inject the midline pit with methylene blue to stain the entire diseased area and avoid overlooking secondary tracts. This has probably fallen out of favor, because significant healthy tissue can be stained, leading to larger excisions that are not warranted.

Shaving of surrounding hair

Shaving hair is perhaps the aspect of postoperative care most overlooked by the inexperienced surgeon. Shaving the edges of the open wound for 3 cm to 4 cm is a must [30,55,56]. Pilonidal disease may heal without treatment other than shaving. The question is how long to continue shaving after healing occurs. This remains controversial, but the role of hair in keeping these wounds open should not be ignored.

Treatment with phenol

Phenol has been reported to cure pilonidal disease with treatment by injections. After the surrounding hair is shaved, hair and debris inside the tracts are removed with curettes and sponge. The skin around the pits may be excised with a 1 mm margin. Petroleum jelly is placed on the skin at the wound margin for protection. The wound is thoroughly mopped out with a small sponge soaked in liquefied phenol. The tissue turns white on contact with the phenol and additional free hair may surface. The patients are seen weekly in the office and the granulating wound is mopped with a small sponge soaked in phenol. The maximum contact time is two or three minutes. Blumberg [57] reported on 11 patients (7 with recurrent disease after surgical procedures). Follow-up was from 7 weeks to six years. Healing occurred in all patients in 5 to 16 weeks (mean 9.5).

Squamous cell cancer

Carcinoma arising in a pilonidal sinus is rare [58,59]. The cancer is squamous cell carcinoma from chronic inflammation and draining sinus tracts.

Table 1
Management of pilonidal disease from simple to more complex. Any abscess should first be drained as an urgent procedure

Fistulotomy and curettage
Marsupialization
Bascom procedure (follicle removal and lateral drainage)
Excision and closure
Karadakis
Excision and skin grafting
Cleft closure
Flaps
Z-plasty
V-Y advancement flap
Rhomboid (Limberg) flap
Gluteus maximus myocutaneous flap

This cancer has a high recurrence rate and poor prognosis. One study reviewed the outcome of 56 patients and the relevant literature [60]. After a mean follow-up time of 28 months, 20% of all patients died with evidence of disease, and an additional 10% died of unrelated causes. The overall recurrence rate was 39% and the median time to recurrence was 9 months. Treatment consists of en bloc resection. Radical surgery with radiation therapy decreases recurrence when compared with surgery alone (30% versus 44%). Radiotherapy should be used with generous margins, due to ill-defined extension of disease. Chemotherapy may also convey an increase in cure rate, but this has not been proven.

Recurrent pilonidal disease

Although the vast majority of patients will heal with simple procedures, there is a small subset in which disease persists either as a recurrent sinus or an unhealed wound. In this subset more extensive operations are justified. Multiple procedures are available when recurrence occurs. In our practices, religious wound care and monthly shaving of hair has resulted in cure in all patients who have failed outside treatments.

Summary

Pilonidal disease is a disease of young people, usually men, which can result in an abscess, draining sinus tracts, and moderate debility for some. It probably results from hair penetration beneath the skin, for reasons that are not totally clear. Therapy should be simple, inflict minimal pain, have a short hospitalization, have a low recurrence rate, require minimal wound care, and allow rapid return to normal activity. No treatment meets all these ideal goals. Therefore, starting with a simple treatment and progressing to other treatments if failure occurs despite meticulous wound care and hair shaving is the logical approach. Table 1 depicts treatments from simple to more complex.

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