Pilonidal Disease

13

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13.1 Definitions and Risk Factors

The term "pilonidal" dates back to the year 1880 when R. M. Hodges coined the term which basically translates into "hair nest" [1]. A pilonidal sinus is a chronic subcutaneous tract in the natal cleft, which spontaneously drains through the skin openings [2].

Pilonidal disease is a common problem with an overall incidence of 26 per 100,000 individuals. This disease is most commonly seen in adolescents and young adults [3]. Pilonidal disease rarely occurs in individuals older than 40 years of age, and it is believed to be an acquired condition as opposed to a congenital one [4]. Patients with a deep natal cleft are prone to acquiring pilonidal disease because it is a favorable environment for sweating, maceration, bacterial contamination, and penetration of hairs [5]. Other predisposing factors include obesity, history of folliculitis or a furuncle on another body region, hirsutism, and family history. In a retrospective study published in 2009, a positive family history was found to also predispose patients to a higher recurrence rate after surgery [6]. It seems as though the familial predisposition is related to other family members having similar hair patterns and body habitus rather than an actual genetically transmitted origin of the disease. In addition, certain occupations such as hairdressers, military personnel, and sheep shearers were reported to be at increased risk of developing pilonidal disease [3].

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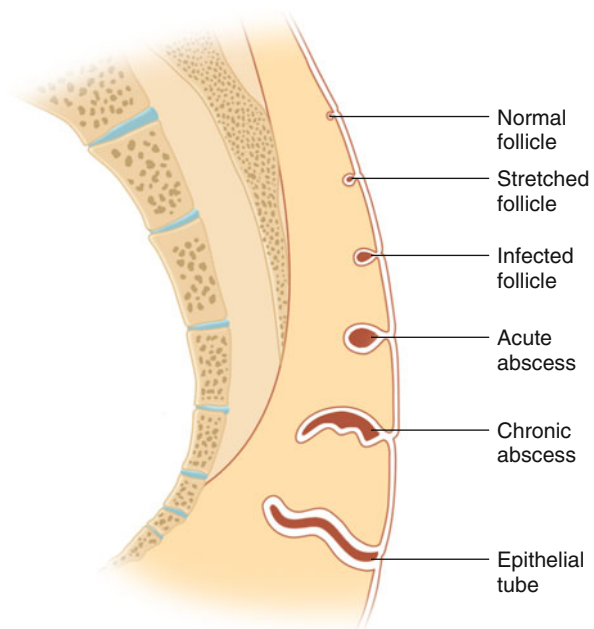
13.2   Pathogenesis of Pilonidal Disease

There is no objectified right answer as to how pilonidal sinuses form; however, there are two schools of thought about the pathogenesis of this disease. Bascom believed that the natal cleft was normal and that it was simply the result of a hair follicle filled with keratin that eventually becomes infected, very similar to a furuncle, extending its way into the subcutaneous fat (Fig. 13.1). A more common belief is that of Karydakis, who stated that a loose hair shaft finds its way into the gluteal cleft, burrowing into the skin, causing the formation of a pit which allows for other hair shafts to insert (Fig. 13.2). This loose hair eventually causes an inflammatory reaction that can either become chronic or develop into an abscess [7]. Though the latter theory is more widely taught and believed, there is no evidence to prove one theory over the other.
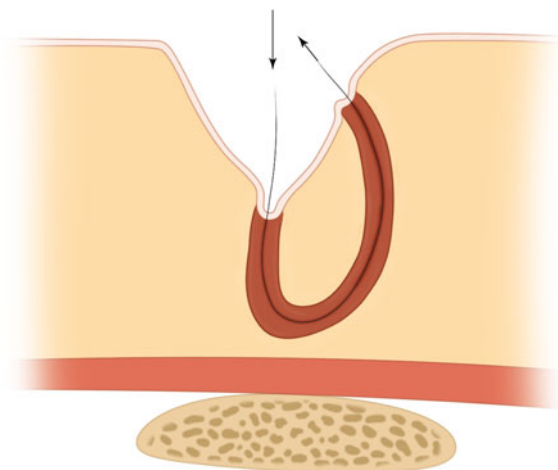
13.3   Clinical Presentation

How does one recognize pilonidal disease? Look for pits. These pits represent primary and secondary openings of the pilonidal sinus. The primary opening(s) is usually located at the base of the natal cleft, roughly 5 cm above the anus, and is the opening through which hair may be observed to protrude (Fig. 13.3). There is a subcutaneous tract that forms from this primary opening, creating a sinus. The sinus(es) can vary in length and number. The pit may form tracts that create a

Fig. 13.1 Pathogenesis of pilonidal disease

Normal follicle

Stretched follicle

Infected follicle

Acute abscess

Chronic abscess

Epithelial tube

Fig. 13.2 Pathogenesis of lose hair inserting and burrowing under the skin, forming a sinus tract


Fig. 13.3 Sinus opening in the natal cleft (adapted from Hong and Ryoo [7], with permission)

secondary opening off the midline. These secondary openings are where spontaneous drainage or incision and drainage of an abscess occur. The pilonidal tract along with its two openings, the primary and secondary sinuses, can be visualized on the sketch in Fig. 13.2. Patients can have a single or multiple secondary openings, depending on the chronicity and complexity of the disease.

Patients can present with either an acute pilonidal abscess, a single chronic draining sinus, or a complex or recurrent pilonidal sinus [3] which are treated in different ways as will be discussed later. A pilonidal abscess usually presents as a tender, fluctuant mass with overlying cellulitis (Fig. 13.4) as opposed to a chronic draining sinus, which shows no signs of infection. A chronic sinus presents with a primary pit located in the natal cleft often with possible hair sticking out of it's opening (Fig. 13.3).
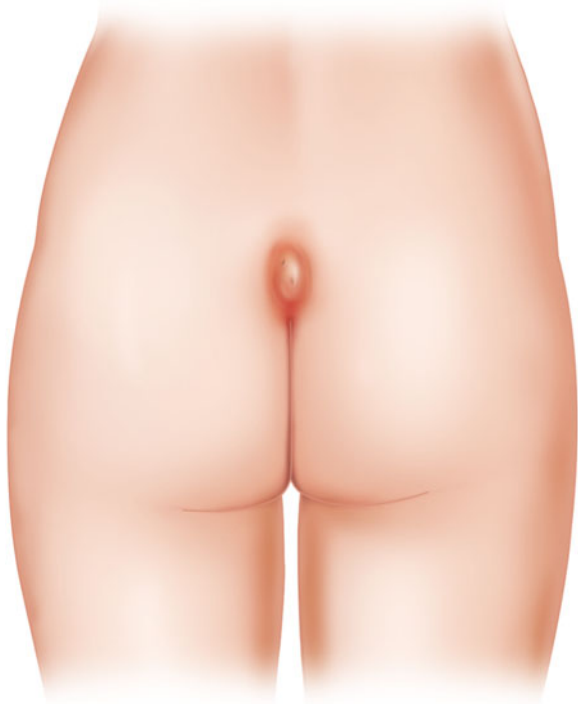
Complex and recurrent pilonidal sinuses are usually the result of persistent sinuses or multiple abscess drainages that may have more than one opening to the skin. It is important to keep in mind that other diseases such as anorectal cryptoglandular abscesses, hidradenitis, and fistulas secondary to complex presentations of Crohn's disease can present similarly to pilonidal disease and need to be ruled out as possible differential diagnoses [8, 9]. Although pilonidal disease is not life threatening, it can be debilitating for the patient and poorly impact their quality of life. Regardless of the presentation of pilonidal disease, the ultimate goal for treatment is to decrease morbidity for the patient and to allow for quick recovery and return to daily activities.
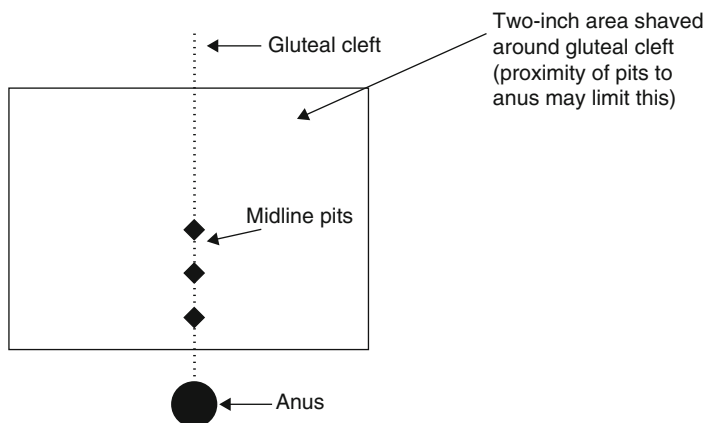
13.4   Management of Pilonidal Abscesses

Case 1

A 24-year-old man presents to the emergency room complaining of "pain over their tailbone." This is the first time he has ever felt such pain. He recalls falling on his tailbone during his speed skating practice roughly 2 weeks ago. He also mentions that he had a fever yesterday with some chills over the last 2 days. He first noticed

Fig. 13.5 Pilonidal abscess (from Slater [9] with permission)

Gluteal cleft

Two-inch area shaved around gluteal cleft (proximity of pits to anus may limit this)

Midline pits

Anus

Fig. 13.6 Technique for shaving (adapted from Papaconstantinou and Thomas [3], with permission)

a "lump" about a week ago but came in today to see you because he felt that it increased in size and the pain was keeping him up at night. He denies any other lower gastrointestinal symptoms or abdominal pain.

On exam, he is afebrile and his vital signs are all within normal limits. Abdominal and digital rectal exam are unremarkable. You notice an inflamed, erythematous lump at the natal cleft with no spontaneous discharge (Fig. 13.5). It is very tender and fluctuant.

This is a typical presentation of a pilonidal abscess. Just as in any other clinical presentation of an abscess, this patient presents with the universal signs of erythema, pain, and cellulitis. In the case of a pilonidal abscess, the technique used to drain the abscess is important (Fig. 13.6).

When a patient presents with a pilonidal abscess, it is usually located lateral to the midline despite the initial sinuses being located in the midline, along the gluteal

Fig. 13.7 Sketch of proper incision technique for incision and drainage of a pilonidal abscess (adapted from Papaconstantinou and Thomas [3], with permission)
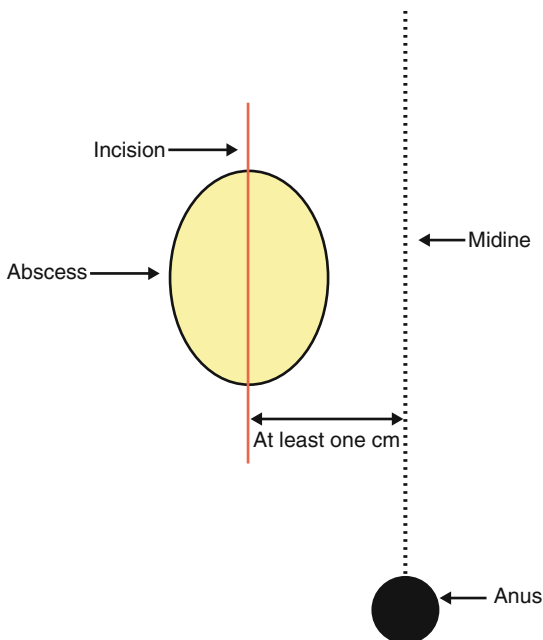
cleft. Studies have shown that the best way to drain the abscess is to make the incision off the midline [2] because this leads to better healing. A midline wound is under constant traction and vacuum forces that allow surrounding hair and bacteria to enter the wound impair wound healing [10], whereas an off-midline incision may be less likely to create this traction force. The incision is ideally made about 1 cm lateral to the midline and deepened all the way down into the cavity, to ensure that the abscess cavity is opened and pus and any other material, such as hair, can be evacuated [3] (Fig. 13.7).

Once this is completed, the incision is converted to a cruciate or elliptical incision to ensure the skin and subcutaneous tissues overlying the abscess cavity do not close prematurely and lead to a recurrence of the abscess. The cavity is then copiously irrigated. A randomized control trial assessed the benefit of performing a curettage at the time of incision and drainage, and the authors found that there was a significant difference in healing at 10 weeks after the procedure and lower recurrence rates observed with curettage [11]. This is due to removal of all inflammatory debris that may impair healing and removal of all epithelialized surfaces to encourage quicker wound healing. As such, once the cavity is irrigated, a gentle curettage should be performed, followed by a light packing of the cavity (Fig. 13.8).

The act of packing a wound and removing the packing for cleansing at least once daily promotes healing; however, it can be quite painful and bothersome for the patient, which may lead to poor posttreatment compliance to wound care. For this reason some surgeons advocate that the packing be removed the following day by the patient and the cavity be washed with soap and water, preferably two to three times a day to accelerate healing [2, 3] and to help keep the area clean. If the

Fig. 13.8 Packing post incision and drainage

wound is packed daily, it should be lightly packed with saline gauze to allow a good balance between keeping the wound dry and promoting the formation of granulation tissue to ensure proper healing. Any hypertrophic granulations tissue should be cauterized with silver nitrate as this will allow for adequate epithelialization to occur [2].

One very important point for the promotion of healing and prevention of recurrent disease is to ensure that hair surrounding the diseased area is shaved regularly. There should be a close follow-up, with visits scheduled every 2 weeks in order to ensure that the wound is healing well and there are no signs of recurrence [3, 11].

Although this patient presented with a history of fever and chills, incision and drainage of the abscess is sufficient to treat the infection. The role of post-drainage antibiotics has been reviewed, and there is no strong evidence to consider treating patients after drainage with antibiotics as such treatment has not been shown to improve the risk of wound complications and healing rates [11]. The only patients for whom post-drainage antibiotics may be considered are those who are immunocompromised, have any prosthetic implants, are known diabetics, or have significant cellulitis [11].

Most pilonidal abscesses heal very well following incision and drainage [11]; however, some may require further incision and drainages or debridement because of the excess in granulation tissue that forms in the wound. All pilonidal sinuses, if symptomatic, will need further elective management for eradication.

13.5 Management of a Pilonidal Sinus

Case 2

The same 24-year-old patient, who presented with a pilonidal abscess earlier, now comes to your office, 3 months after having his abscess drained in the emergency room. He is feeling well and his wound has healed. He comes to see you because he is complaining of staining his undergarments regularly with light colored yellow

Fig. 13.9 Numerous non-inflamed midline pits, the primary source of the disease (*small arrow*). Hairs extrude from the secondary sinus (*large arrow*) (adapted from Nivatvongs [2], with permission)

fluid. On further examination, you notice that he has multiple pits in the natal cleft, with a secondary opening off the midline where his abscess was drained. There is no sign of recurrent abscess and there is no induration or tenderness on exam. You notice small little hair shafts sticking out of the pits and secondary opening (Fig. 13.9). How would you treat this young man?

13.5.1 Nonoperative Approaches

There is a role for nonoperative management following an initial episode of uncomplicated pilonidal disease. Thus, this patient may be offered conservative treatment. An important component of the nonoperative approach for the treatment of pilonidal disease is shaving and hygiene around the diseased area (see Fig. 13.1). This simple act in addition to a limited lateral incision for drainage of the index abscess

has been shown to decrease the number of hospital admission days, decrease the number of surgical procedures and is associated with an earlier return to work when compared to more invasive surgical techniques [11]. This conservative, noninvasive practice of meticulous hair control and perineal hygiene has been used for quite some time. In a study with military personnel in the mid-twentieth century, Armstrong and Barcia retrospectively reviewed outcomes of patients that were treated with a variety of surgical approaches and compared their outcomes to a prospective cohort of 101 patients who were solely treated using a conservative, nonoperative approach consisting of shaving 5 cm around the diseased area. In this pilot study, no patients who had undergone conservative treatment had any evidence of unhealed wounds and all were able to continue serving in the army during their treatment [12]. Their data strongly suggested that conservative treatment was superior to excisional therapies although they did not control for the different operative approaches. This approach however was not as effective in patients suffering from recurrent disease after having undergone an excisional procedure [12]. The most recent 2013 practice parameters developed by the Standards Practice Task Force of the American Society of Colon and Rectal Surgeons suggest that gluteal shaving should be used as a primary and/or adjunct treatment measure for acute and chronic pilonidal disease. Although there is no ideal extent of shaving that has been determined in the literature, the common recommendation is roughly a 4–5 cm area be shaved around the pits in the gluteal cleft [3]. In our practice, we advise patients to remove their hair from the lower back to the lower thighs, including the perineal area. We have found that in hirsute individuals, surrounding hairs easily travel into the cleft from more distant areas. Moreover, it is important to continue regular hair removal in the postoperative period if a patient has undergone a surgical procedure. The length of time and frequency of shaving however are not clear, so it is currently recommended to do so until the wound is healed [10]. It is very important to avoid leaving any little hairs behind as even one single hair shaft can lead to impaired healing and possible recurrence. The majority of surgeons advise their patients to continue keeping the area around the healed wound bare of any hair in order to prevent recurrence. There is controversy around the topic of shaving with studies actually showing that shaving is harmful and leads to higher recurrence rates in patients operatively treated for pilonidal disease. One reason for this is that possible microtrauma that results secondary to the blades [13]. For now, the idea of hair removal is compelling and there are promising studies looking at other methods of hair removal such as laser. In one study of 14 patients with recurrent disease, all patients reported improvement in their disease, with only 4 diagnosed with recurrent disease. One important disadvantage was the pain associated with the laser procedure [14]. Despite these findings, there is still insufficient evidence for this technique to be generally used. In our practice, we recommend clipping, depilation creams, or waxing, rather than shaving, to avoid the microtrauma caused by the razor blade.

Other possible nonoperative treatments that can be used for chronic pilonidal sinuses include the use of phenols or fibrin glues to attempt to occlude the tract. Small series have reported up to 95 % success rate with phenol injections combined

with proper hygiene and excellent hair removal of the surrounding area [11]. Another study by Dogru et al. in 2004 showed that crystallized phenol placed into a wound resulted in low recurrence rates at 8-month follow-up [15]. The crystals were applied in the wound after careful removal of all remaining hair or debris, allowed to liquefy at body temperature, and then expressed out of the wound after a 2 min period. This noninvasive technique appears promising however availability of these crystals may be an issue [2]. A review in 2009 concluded that phenol injections were appropriate for patients with 1–3 sinus tracts with good overall success rates, up to 97 %, with quicker return to work despite longer healing times, up to 1 month. Despite this, the current evidence is weak and more studies are needed to assess long-term outcomes [16].

Fibrin glue also appears to be promising in a variety of settings such as application after the curettage of the sinus tracts or in the bed of the excised tract prior to primary closure [11]. Most studies looking at fibrin glue are small series; however, success rates reported are quite high, up to 100 % in some, with minimal recurrence and good tolerance by the patients [11, 17, 18]. One retrospective review with 93 patients treated with fibrin glue over a 5-year period found high levels of patient satisfaction as well as rapid return to normal activities [18]. Lastly, similar to the treatment of an acute pilonidal abscess where antibiotics are not recommended, the use of oral or intravenous antibiotics for chronic disease has not been found to have any benefit for the patient. In both the pre- and postoperative settings, antibiotics have not shown any significant benefit for wound healing or prevention of complications when compared to patients not receiving them [19]. In addition, the evidence for use of topical antibiotics such as gentamicin-impregnated sponges is conflicting. Some studies have found a positive association between topical antibiotics and healing, while other studies showed no benefit. It remains unclear whether topical antibiotics in the treatment of chronic or complicated pilonidal disease have any advantages and more studies are looking into this matter. In summary, at this time, antibiotics should only be used as adjuncts in patients with severe cellulitis from an abscess or any underlying systemic illness or immunocompromised patients [11].

13.5.2 Operative Approaches

When the nonoperative approach fails, it is best to proceed to surgery. If a patient suffers from chronic, recurrent, or complex pilonidal disease, the surgeon must decide whether to proceed with an excisional approach with primary closure of the defect or excision with secondary healing of the wound. There is no strong evidence proving one approach is superior to the other, and in the end, it comes down to surgeon experience and comfort level in performing the procedure. In other words, there is no ideal treatment modality that has proven to be strongly superior to other approaches. There are a few differences in outcomes of these two approaches (which will be reviewed later); however, the main goal of treatment for pilonidal disease is one that allows the patients a quick return to their daily activities, has a low recurrence rate, minimizes pain, requires limited wound care, and is

cost-effective [8]. Keeping all of this in mind, this allows the surgeon to tailor the best approach for each patient.

Operative approaches for pilonidal disease can be classified by wound closure as follows: primary closure or open (secondary) wound closure techniques. A Cochrane review in 2009 looked at the healing rates of primary versus secondary closure in the surgical treatment of a pilonidal sinus. Their primary outcomes were time to healing, infection, and recurrence rates. Overall, there were benefits to either approach such that patients who had primary closure of their wounds showed more rapid healing and quicker return to work, whereas those with open healing wounds had lower recurrences. The good news is that both approaches showed no difference in infection and complication rates as well as length of stay after the procedure [20].

The open wound approaches include traditional wide excision with packing of the wound, the use of vacuum-assisted closure (VAC) therapy, or marsupialization of the sinus tract, whereas primary closure approaches include a variety of flap procedures with midline or off-midline closure of the wound. All these approaches will be covered in the following sections.

There are several ways one can approach treating pilonidal disease. The open wound approaches have been used for years and are still very successful at treating pilonidal disease because they are simple to perform and many surgeons feel comfortable with this technique. They have also been found to have lower recurrence rates compared to primary closure [20]. The primary flap closure techniques are mostly reserved for the more complex cases, including patients who have failed prior treatment or who persistently have recurrence of their disease, despite having undergone surgical management. There is minimal prospective evidence that compares excision with secondary healing versus excision and primary closure. There is an older randomized control trial that found midline excision with primary closure to show no clear benefit over the secondary healing technique and had a tendency toward higher recurrence rates [21]. In this case, the patient had a recurrence following an excision with primary midline closure. A reasonable approach at this point would be to offer him excision of the sinus tracts with an open wound healing by secondary intention. Several open techniques exist and will be described below.

Case 3

A 27-year-old male presents to your office 6 months after having undergone a resection and primary midline closure of a pilonidal sinus. On his initial follow-up visits after surgery, he was doing well and the wound was healing nicely. He is now complaining that the sinus and discharge has come back. It is not that painful but he regularly has discharge and it is uncomfortable to sit. He also mentioned that his girlfriend noticed some hair sticking out of the sinus tract. He denies any other symptoms. You recall having offered him resection and primary closure because he works as a security guard and really wanted to get back to work as quickly as possible.

On exam, you notice a healed midline scar with three small little pits, with hair sticking out of them. No discharge or induration is observed. Digital rectal exam is normal.

13.5.3 Open Wound Approaches

13.5.3.1 Midline Excision of Sinus Tracts

In the case of a chronic sinus, it is still advocated to proceed with a traditional excision of the sinus tract with secondary healing [14]. Because the sinuses or pits are located in the midline of the gluteal cleft, the natural tendency when excising the sinus tracts is to make an elliptical incision to encompass the pits (Fig. 13.10). Once this is done, the skin and tissue are discarded and the cavity is irrigated. Contrary to traditional teaching, it is not necessary to dissect the subcutaneous tissues all the way down to the presacral fascia [3]. The open cavity is then packed with saline gauze and left to heal by secondary intention. The packing, as in the case of the abscess, acts initially for hemostasis and then to prevent further hair from entering the area. Post-procedure, patients should be continuously reminded to keep the area clean and free of any hair. With proper wound care and regular follow-ups, patients heal very well over a 4–6-week period.

In the case of excision and secondary healing, sometimes the cavity can be quite extensive and morbid for the patient, with longer healing times required. A less morbid alternative is to simply unroof the sinus pits and lay open and curettage the tracts. This results in a smaller wound that will require roughly half the healing time [3]. It is also associated with a recurrence rate of 13 % [3]. In order to accelerate wound healing, marsupialization can be performed and/or a vacuum-assisted closure device can be used.

Fig. 13.10 Excision of midline pits (adapted from Fette and Pichotta [22] with permission)
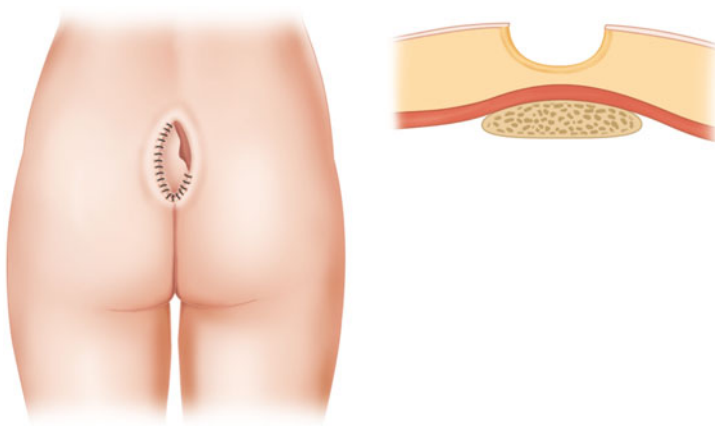
13.5.3.2 Marsupialization

Marsupialization of a wound is a well-known treatment for patients with chronic pilonidal sinuses. It is done by opening a midline wound, over the pits, and unroofing the underlying sinus tract. Once this is done, the granulation tissue is scraped with a curette and the walls of the tract are sutured to the skin edges, keeping the tract open and allowing it to heal (Fig. 13.11).

The act of marsupializing a wound allows it to remain open by converting a closed cavity into an open tract [2]. There is no strong evidence demonstrating the efficacy or superiority of marsupialization over primary closure techniques. As mentioned earlier, there are advantages to both open and closed approaches to wound healing, so it is surgeon preference and comfort level that decide the method to be used. One recent randomized controlled trial looked at comparing marsupialization to rhomboid excision and Limberg flap in patients with chronic pilonidal sinuses. Outcomes included postoperative pain level, return to daily activities, and time to healing. Marsupialization was found to have a shorter hospital stay and return to daily activities; however, patients undergoing the flap procedure had quicker healing times and scored slightly higher on the quality of life questionnaires, which is probably a result of the postoperative wound care required after marsupialization. Overall, the authors felt that marsupialization provided more clinical benefits over the Limberg flap and should be the procedure of choice for patients with chronic pilonidal disease, as long as patients are made aware of the dedicated wound care required postoperatively [23].

13.5.3.3 Vacuum-Assisted Closure Therapy

After the midline pits have been circumferentially excised (Fig. 13.10), another technique used to accelerate wound healing is the placement of a vacuum-assisted closure (VAC) device (Fig. 13.12). The VAC device is a tool that accelerates the formation of granulation tissue by optimizing blood flow, it keeps the wound dry,

Fig. 13.11 Marsupialization of the wound. Frontal and cross-sectional view of the marsupialization technique

Fig. 13.12 Application of VAC device for healing (adapted from Saad et al. [24], with permission)

and it removes excess bacteria which promotes wound healing [22, 25]. Because of its special properties, it decreases the treatment time as well as the incidence of septic complications [26]. The VAC is applied to the wound immediately after curettage and only needs to be changed if there is any evidence of soaking or leaking from the wound, indicating saturation of the VAC sponges. Patients are regularly followed in clinic, ideally by a wound care specialist nurse, who ensures that the wound is healing well and that there are no developing wound complications. In a small, randomized prospective study analyzing the benefits of VAC therapy versus conventional wound packing for patients with a chronic pilonidal sinus, the authors found that patients treated with a VAC had a significant decrease in length of healing time compared to the packing group as well as a quicker return to work and regular activities with decreased overall pain [24, 26].

13.5.3.4 Coring Out of Pits

A less invasive technique for treating primary disease includes simply coring out each of the individual pits and sites of previous drainages, in addition to curettage of the sinus tracts, allowing the wounds to heal by secondary intention. In our practice, we prefer this method because of the decreased morbidity to the patient. It is also a good way to see how the patient responds to a minimally invasive approach, without burning any bridges. If the patient heals, then this spares him/her a more extensive en bloc resection. It is a reasonable approach to use for patients with simple, chronic, or even recurrent sinuses who do not warrant a more extensive operation. We have observed excellent success with this approach, and the rare patients who recurred were managed by an open excisional approach.

There are a few ways to proceed with the coring out of the pits and the secondary opening(s). In our practice, we simply excise the pits with a scalpel, similar to the technique used for excising the pits in a Bascom I repair, which will be described later on. Each individual pit is excised with an incision no greater than a grain of rice. The incisions are then left to heal by secondary intention to avoid closing a cavity to minimize recurrence. In addition, we counsel patients to keep excellent

hygiene, have daily wound care, shave the entire area regularly, and maintain low physical activity until the wounds have completely healed. In our experience, this method is quite successful.

Another minimally invasive approach has been studied using trephines to core out the pilonidal pits followed by debridement. A study assessing long-term outcome of this technique in roughly 1300 patients found that this trephine technique was a feasible approach with low recurrence rates of 6.5 % at 1 year and 16.2 % at 10 years and low postoperative morbidity [27]. Trephines ranging from 2.0 to 9.0 mm in diameter were used to core out both superficial pits and larger, deeper tracts that connected to a cavity. This was followed by debridement of underlying tracts and cavities when present. Patients were then sent home and followed up at regular intervals for wound assessment and debridement or re-excision if necessary. Most patients in this study had previous drainages and excisions of various types rendering this technique plausible in patients with difficult pilonidal disease presentations.

Sinusectomy is also described as a technique that could be used to treat primary pilonidal disease. It is thought to be a less invasive approach with less morbidity for the patient. A Swiss study showed that sinusectomy had a low recurrence rate of 7 % at 4 years with a quicker return to work and improved quality of life [28]. The approach is simple and consists of injecting the sinus tracts with methylene blue to delineate each subcutaneous tract. Once this is done, each pit opening and individual tract can be excised and left to heal by secondary intention. In this study, patients were advised to keep the area clean at least twice a day and practice proper intergluteal hygiene, including shaving the area of the natal cleft [28]. This is a reasonable approach for patients with simple pilonidal disease and avoids the morbidity of larger en bloc excisions.

13.5.3.5 Bascom's Midline Pit Excision and Closure with Curettage (Bascom I)

This open technique has been mostly used in patients who present with chronic abscesses. Similar to the management of an acute pilonidal abscess, you make an off-midline incision, roughly 1 cm from the midline, which is dissected down to the cavity. The cavity contents are then curetted to encourage healing. Next, the midline pits are individually excised and closed, allowing only one route for drainage, through the off-midline wound which is left open. The size of the excision for each pit should be very small, comparable to a grain of rice [3]. It is feasible to perform this procedure under local anesthesia and it is generally well tolerated by patients [29] (Fig. 13.13).

13.5.4 Primary Closure Techniques

Case 4

A 32-year-old obese, hirsute male presents to your office for a second opinion. He is a smoker. He has been suffering from pilonidal disease for 6 years. Four years ago, he underwent an excision with primary midline closure, which recurred the
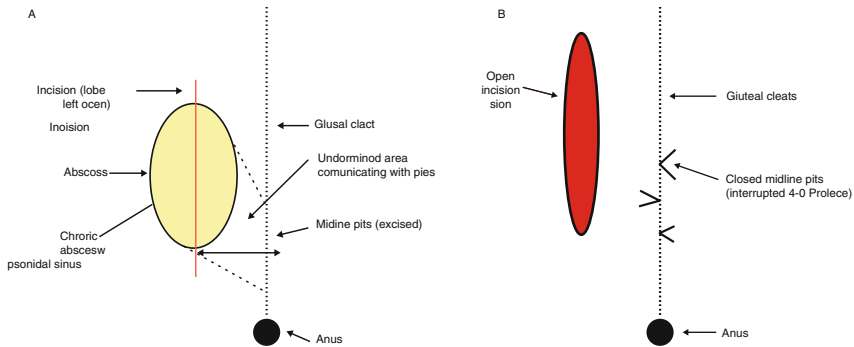
Fig. 13.13 Bascom I procedure (adapted from Papaconstantinou and Thomas [3], with permission)

following year. He then underwent excision and healing by secondary intention. Unfortunately, he had recurrence of abscesses twice in the last year that were treated with incision and drainage while travelling overseas. On exam, you notice midline pits with multiple surrounding scars and underlying fibrotic tissue from his previous interventions. What would you offer him at this point?

Case 5

A 28-year-old female flight attendant comes to see you with a recurrent pilonidal sinus. She has had one abscess drainage in the past and now noticed midline pits with serosanguinous discharge that stains her undergarments regularly. She is very anxious about this problem and would like to have it treated quickly. Because of the nature of her work, she cannot afford to remain off work for a long period of time and has read on the internet that there is an operation that can help her heal quickly with a good quality of life. What would you offer this patient?

Both of these patients suffer from recurrent pilonidal disease and both would benefit from a primary closure procedure. There is no ideal procedure to date that has proven to be superior to others, and most procedures are performed based on surgeon preference and comfort level. A Cochrane review found that patients who underwent primary closure procedures, including a variety of flap procedures, healed more rapidly and returned to work quicker than patients who had open surgical procedures [20]. There are a variety of primary closure techniques for pilonidal disease, and these approaches can be further divided into midline and off-midline closure procedures. The same Cochrane meta-analysis addressed midline versus off-midline primary closure procedures (also including flap procedures) and concluded that there was strong evidence demonstrating that off-midline closure is superior to midline closure with regard to faster healing times, less infections, and lower recurrence rates [20]. Midline closures can have recurrence rates as high as 42 % [30]. In addition, the data from the meta-analysis was strong enough to suggest that off-midline closure should be the standard management whenever a primary closure approach is chosen [20]. The ASCRS guidelines recommend that patients

with recurrent, complex pilonidal disease should undergo flap-based procedures after failure of other techniques. Although flap procedures have been found to have higher recurrence and higher rate of infection [31], their use for the treatment of complex disease is supported because they allow for the removal of a large area of diseased tissue and the use of healthy tissue to fill the defect. There are multiple flaps described in the literature; some are more invasive than others. We have chosen to describe two off-midline closures including the Karydakis and Bascom II flap and two more involved flap closure techniques including the rhomboid excision and Limberg flap as well as the V–Y advancement flap.

13.5.4.1 Off-Midline Closure Techniques

Karydakis Flap
This technique was first described in 1965, in Greece, by Dr. Karydakis. The goal of this procedure is to excise diseased tissue located in the midline and then displace healthy tissue laterally [3]. Figure 13.14 depicts the frontal and cross-sectional views of this procedure. Basically, you mark an ellipse around the diseased midline area, big enough to encompass at least 1 cm of tissue lateral to the midline. You then dissect all the way down to the sacral fascia. The flap is then sutured down to the sacral fascia in such a way that it is laterally pulled over to cover the defect. Once this is done, you close the incision, which should now be laying lateral to the midline.

In one series by Karydakis, he followed his patients for 21 years after the procedure and had a recurrence rate of 1 % [32]. This procedure was also found to have low morbidity and high patient satisfaction [33].
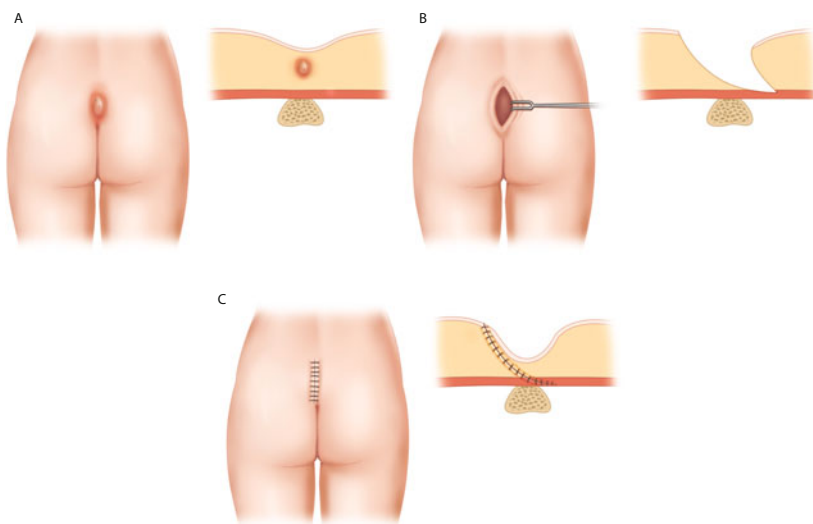

Fig. 13.14 Karydakis technique

Bascom Cleft Lift Procedure (Bascom II)

This procedure was developed after the Karydakis flap and is similar in such a way that it excises tissue and closes the defect off midline. The difference is that the Bascom II procedure does not excise any normal subcutaneous tissue, where the Karydakis approach does. In addition, with this technique, only a portion of the skin is excised and the underlying gluteal fat is re-approximated in the midline to obliterate the gluteal cleft (Fig. 13.15). The remaining sinus cavities are curetted and left to heal as opposed to being excised. In a prospective randomized controlled trial comparing Bascom I to Bascom II, the authors concluded that both procedures were successful in the treatment of pilonidal disease; however, Bascom II was the preferred technique to treat moderate to severe disease [29]. In addition, recurrence rates were less for Bascom II compared to Bascom I mostly because of the flattening out and obliteration of the natal cleft [29].
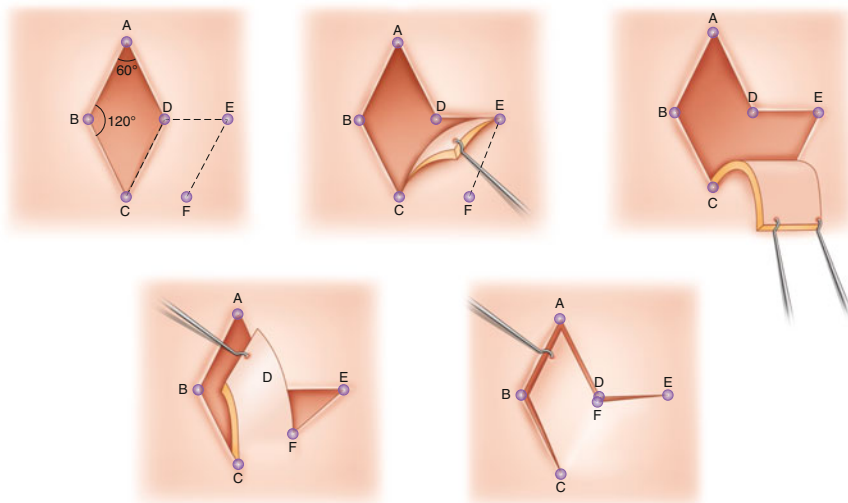
13.5.5 Flap Closure

13.5.5.1 Rhomboid Excision and Limberg Flap

As shown in Fig. 13.16, the rhomboid excision and Limberg flap procedureconsists of removing the diseased area with a rhomboid-like excision (points A–B–C–D)
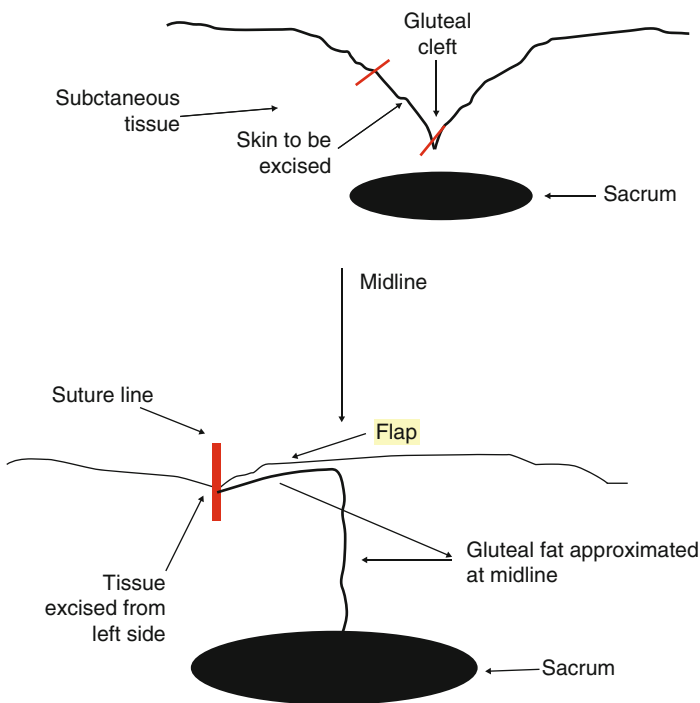
Fig. 13.15 Bascom II (adapted from Papaconstantinou and Thomas [3], with permission)

Fig. 13.16 Rhomboid excision and Limberg flap

Fig. 13.17 Rhomboid
excision and Limberg flap
(adapted from Altintoprak
et al. [34], with
permission)

and using a flap from tissue adjacent to it (C–D–E–F) to cover the defect. The main
problem with this flap procedure is the removal of a large amount of tissue along
with a poorer cosmetic end result (Fig. 13.17). It is a preferred method for patients
who have their abscess and pits all located more or less close to the midline, as the
amount of tissue that would have to be removed is less, therefore causing less mor-
bidity and an improved end cosmetic result. This technique can also be considered
in patients who have previously had their disease removed in the midline and now
have a chronic non-healing wound [3]. In a randomized trial looking at the Limberg
flap compared to primary midline closure, the Limberg flap proved to have fewer

complications, quicker healing, shorter hospital stay, and less pain compared to midline closure [5]. Furthermore patients who received the Limberg flap procedure were more satisfied and had a better quality of life. Another study by Daphan et al. [35] showed similar results with lower recurrence and complication rates, quicker return to daily activities, and less pain in their cohort of young males treated with the Limberg flap technique. Overall, recurrence rates range anywhere from 0 to 6 % [11]. Due to the extensiveness of this procedure, cosmesis may be an issue for patients. A study particularly looking at cosmesis found that patients' perceived outcome was overall good, possibly due to the fact that the area is mostly hidden; however, it was an issue for some which is why patients must be well informed about the overall outcome [30, 34, 36].

13.5.5.2 V–Y Advancement Flap

This tension-free flap procedure is used in the treatment of complicated, extensive, and recurrent pilonidal disease. It was first described by Khatri et al. in 1994 [37]. As seen in the pictures below, it consists of a large elliptical incision made around the midline pits and dissected all the way down to the sacral and gluteal fascia. The diseased area is then resected. A "V"-shaped incision is made lateral to the ellipse with one arm starting at the superior aspect of the ellipse and the other from the inferior edge, meeting laterally on the gluteal area. The triangular island of tissue is advanced medially and joined to the lateral edge of the elliptical defect, flattening out the natal cleft. This edge is sutured and the two other sides are sutured superiorly and inferiorly in order to create a "Y" configuration as is seen in Fig. 13.18. This is a convenient flap procedure with minimal recurrence rates because of the flattening of the natal cleft [38]. The wound heals well and the procedure is well tolerated by patients; however, similar to the Limberg flap, cosmesis may be an issue and should be mentioned during preoperative discussion of potential outcomes with the patient. Recurrence rates are described to range between 0 and 11 % [39].

Fig. 13.18 V–Y advancement flap (adapted from Altintoprak et al. [34], with permission)

When the Limberg flap was compared to the V–Y advancement flap, the Limberg flap was found to have lower recurrence rates; however, there was no difference in wound infection, seroma formation, and length of hospital stay [11, 39].

13.6 Conclusion

Pilonidal disease is a common problem with a variety of different approaches to treatment. Because of this variety, many surgeons manage their patients differently, leading to a plethora of treatment options. When assessing a patient with pilonidal disease, it is important to take a good history and perform a focused physical exam, asking about any past medical or family history, including inflammatory diseases, as well as previous treatments patients may have received. This will give you an overall sense of how simple or complex the patient's problem may be. Once you have gathered all this information, you can make a diagnosis and use the treatment algorithm (Fig. 13.19) to help guide your decision-making.

Although there are many studies looking at pilonidal disease and its different treatment approaches, it is important to understand that there is strong evidence supporting the use of open techniques to minimize recurrence and to use off-midline closure techniques to achieve faster healing with lower recurrence rates. This knowledge will help provide better care for patients with the hope of improving their quality of life and decreasing the recurrence rate.

The main goal of treatment is to improve patients' quality of life and help them quickly return to their daily activities. As we have seen in the cases presented, there are multiple ways of approaching the same problem. It is important to offer patients the treatment approach that will best help them deal with the acute phase of their
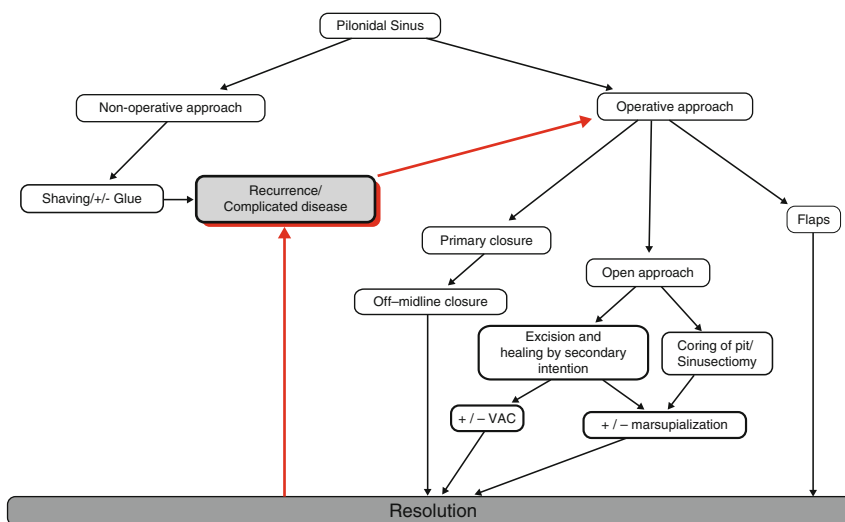
Fig. 13.19 Algorithm for management of pilonidal disease

disease. Whether the problem recurs or persists, it is important to realize one's limitations and to have a low threshold for referral to experts for more advanced procedures, such as flaps.

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