

Pilonidal Disease

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INTRODUCTION

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Pilonidal disease was first reported in 1833. Sacrococcygeal pilonidal sinus is a common disorder among young adults. It is observed most commonly in people aged 15-30 years, occurring after puberty when sex hormones are known to affect the pilosebaceous gland and change healthy body hair growth. The onset of pilonidal disease in people older than 40 years is rare.

History of the Procedure: In the 1950s, pilonidal sinus disease was thought to be of congenital origin rather than an acquired disorder. The pilonidal sinus and abscess were thought to be secondary to a congenital remnant of an

epithelial-lined tract from postcoccygeal epidermal cell rests or vestigial scent cells. Sinuses to the neural canal can occasionally extend to the dura, but these are rare and are located in the lumbar region rather than the sacral region. Pilonidal disease is now widely accepted as an acquired disorder based on the observations that congenital tracts do not contain hair and are lined by cuboidal epithelium. The recurrence of the disorder after complete excision of the disease tissue down to the sacrococcygeal fascia and the high incidence of chronic pilonidal sinus disease in patients who are hirsute further support an acquired theory of pathogenesis.

Problem: In a recent census and survey of patients admitted to England hospitals in 1985 for treatment of pilonidal sinus disease, 7000 patients required hospitalization for an average of 5 days. The hospitalization of these patients for the treatment of pilonidal disease resulted in a loss of productivity, a loss of earnings, and a disruption of education because patients recovered in the hospital.

Treatment options are now available that provide a rapid rate of cure, a lower recurrence rate, and a minimized number of hospital admissions. Although numerous randomized clinical studies have evaluated different treatments, no clear consensus has been reached as to the optimal medical or surgical treatment.

Frequency: The incidence rate of pilonidal disease is approximately 0.7%. Men are affected 2.2-4 times more frequently than women. During a population study involving college students, the incidence rate was found to be 1.1% (365 of 31,497 people) in males and 0.11% (24 of 21,367 people) in females. The onset of the disease is earlier in women, which may be due to earlier puberty in women.

Etiology: The incidence is also affected by hair characteristics such as kinking, medullation, coarseness, and growth rate. White persons are affected more frequently than African or Asian persons. Other factors affecting the incidence are increased sweating activity associated with sitting and buttock friction, poor personal hygiene, obesity, and local trauma, which help to explain why pilonidal sinus disease is common in army recruits. In an article examining pilonidal sinus in Turkish soldiers, the incidence was found to be 8.8%, with the correlation factors known to be family history, obesity, being the driver of a vehicle, and the presence of folliculitis or a furuncle at another site on the body.

Pathophysiology: After the onset of puberty, sex hormones affect the pilosebaceous glands, and, subsequently, the hair follicle becomes distended with keratin. As a result, a folliculitis is created, which produces edema and follicle occlusion. The infected follicle extends and ruptures into the subcutaneous tissue, forming a pilonidal abscess. This results in a sinus tract

that leads to a deep subcutaneous cavity. The direction of the sinus tract is cephalad in 90% of the cases, which coincides with the directional growth of the hair follicle. This usually places the tracking follicle approximately 5-8 cm from the anus. In the more rare instance that the sinus is located caudally, it is usually found 4-5 cm from the anus. The laterally communicating sinus overlying the sacrum is created as the pilonidal abscess spontaneously drains to the skin surface. The original sinus tract from the natal cleft becomes an epithelialized tube. The laterally draining tract becomes a granulating sinus tract opening.

Loose hairs are drilled, propelled, and sucked into the pilonidal sinus by friction and movement of the buttocks whenever a patient stands or sits. Hair enters tip first, and the barbs on the hair prevent it from being expelled so that the hair becomes entrapped. Physical examination occasionally may reveal a tuft of hair emerging from the midline opening in the natal cleft. This trapped hair stimulates a foreign body reaction and infection. Rarely, foreign bodies other than human hair can cause this disease process. Rare case reports exist in which the hair did not come from the patient but, instead, from a bird's feather, the type used to stuff feather bedding.

Clinical: Although pilonidal disease may manifest as an abscess, pilonidal sinus, recurrent or chronic pilonidal sinus, or a perianal pilonidal sinus, the most common manifestation of pilonidal disease is a painful fluctuant mass in the sacrococcygeal region. Initially, 50% of patients first present with a pilonidal abscess that is cephalad to the hair follicle and sinus infection. Pain and purulent discharge from the sinus tract are present 70-80% of the time and are the 2 most frequently described symptoms. In the early stages prior to the development of an abscess, only a cellulitis or folliculitis is present. The abscess is formed when a folliculitis expands into the subcutaneous tissue or when a preexisting foreign body granuloma becomes infected. The subcutaneous cavity and laterally oriented secondary sinus tract openings are lined with granulation tissue, whereas only the midline natal cleft pit sinus is lined by epithelium.

The diagnosis of a pilonidal sinus can be made by identifying the epithelialized follicle opening, which can be palpated as an area of deep induration beneath the skin in the sacral region. These tracts most commonly run in the cephalad direction. When the tract runs in the caudal direction, perianal sepsis may be present. The distinctions among pilonidal disease, fistula-in-ano, and hidradenitis can be difficult to discern. In the differential diagnosis, also include skin furuncle, syphilitic granuloma, tubercular granuloma, and osteomyelitis of the underlying sacrum with a draining sinus.

Recurrent pilonidal disease is observed most commonly after the incision and drainage of a pilonidal abscess. In this setting, the pilonidal sinus has not been excised and is still present after the abscess cavity heals, only to

precipitate a recurrence. After surgical excision, the hair follicle has been removed and is no longer the pathogenic precipitating cause of the chronic pilonidal sinus. Instead, the base of the unhealed surgical wound is believed to become filled with granulation tissue, hair, and skin debris, which is a nidus for the ongoing foreign body reaction that takes place to create the chronic disease. This theory, coupled with the known predisposing intergluteal anatomy that draws hair into the pilonidal sinus cavity or surgical wound, is thought to precipitate the extensive recurrent and chronic disease.

Endoanal pilonidal sinus is a rare variety of pilonidal disease that affects the perianal skin directly or may occur circumferentially around the anus, involving the skin of the anal verge. Three causes of perianal pilonidal disease have been described. First, the pilonidal sinus may tract down caudally, creating a perianal fissure or fistula communicating with the anal canal. Second, hair may enter the healing wound of a surgically managed fistula-in-ano. Third, hair may be propelled and penetrate the normal anoderm and produce a similar foreign body reaction, which is usually observed in the sacrococcygeal region.

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The ideal treatment for a pilonidal sinus varies according to the clinical presentation of the disease. First, dividing pilonidal disease into 3 categories that represent different stages of the clinical course is important. These 3 categories are (1) acute pilonidal abscess, (2) chronic pilonidal disease, and (3) complex or recurrent pilonidal disease.

The surgical management is then tailored to the above classification category. The goals of the ideal procedure for the treatment of this disease should be reliable wound healing with a low risk of recurrence, a short period of hospitalization, minimal inconvenience to the patient, and low morbidity with few wound-management problems. Also, treatment should allow the patient to resume normal daily activities as quickly as possible.

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Relevant Anatomy: A pilonidal sinus can occur in many different areas of the body, but most are found in the sacrococcygeal area in the natal cleft approximately 5 cm from the anus. The characteristic pilonidal sinus is a

midline opening in the sacrococcygeal area in the natal cleft. Not uncommonly, the patient may have a series of openings in the midline or may have secondary lateral openings superior to the midline pit. The sinus tract itself is smooth and lined with squamous epithelium. Eventually, the sinus tract leads to a subcutaneous cavity lined by granulation tissue and filled with nests of hair. The sinus tract openings are actually an extension of the deep cavity. This is why an abscess formation may present either in the midline or lateral to the midline.

Contraindications: Although no specific contraindications exist for the treatment of pilonidal disease, consider the patient's overall situation and well-being. Certainly, acute infections must be drained, and few, if any, situations exist in which one would choose to not do so. When more extensive procedures are required (eg, in the case of chronic or recurrent pilonidal disease), consider the issue from the perspective of the individual patient. Although definitive surgical solutions to a chronic smoldering problem may definitely be indicated, they must be undertaken when the patient can afford the requisite downtime necessary for recovery. Also, weigh the complexity of the proposed surgical procedure against the patient's individual comorbidities and long-term prognosis.

WORKUP

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Histologic Findings: After the onset of puberty, sex hormones affect the pilosebaceous glands, and, subsequently, the hair follicle becomes distended with keratin. As a result, a folliculitis is created that produces edema and follicle occlusion. The infection tracks away from the surface in the trajectory of the occluded follicle. This usually places the tracking follicle approximately 5-8 cm from the anus. In the more rare instance that the sinus is located caudally, it is usually found 4-5 cm from the anus. The lateral communicating sinus overlying the sacrum is created as the pilonidal abscess spontaneously drains to the skin surface. The original sinus tract from the natal cleft becomes an epithelialized tube. The laterally draining tract becomes a granulating sinus tract opening.

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Medical therapy: Phenol injections used as treatment of the pilonidal sinus are more common in Europe than in the United States. Both chronic pilonidal

disease and acute pilonidal abscess (after drainage) may be managed by phenol injection. Eighty percent phenol is injected into the sinus, left there for 1 minute, and then expressed out of the cavity. The sinus is then curetted. This may be repeated as many as 3 times for a total of 3 minutes of phenol exposure at one treatment. The treatments may be repeated every 4-6 weeks as necessary as wound healing progresses. Paraffin jelly may be used to protect the skin from the phenol, which destroys the epithelium.

Phenol sterilizes the sinus tract and removes embedded hair. Phenol injections may be combined with local excision of the sinus. Wound healing usually requires 4-8 weeks. The incidence of recurrence is reported to be approximately 9-27%, which is similar to the incidence following simple excision and packing open the wound. Because of the intense local inflammatory response after the phenol injection, patients usually stay in the hospital overnight. Thereafter, the patient is allowed to return home with instructions to bathe daily and keep the area shaved. Dressings are used for comfort.

Surgical therapy: Pilonidal disease is divided into 3 categories to better determine the most appropriate surgical management. These 3 categories are (1) acute pilonidal abscess, (2) chronic pilonidal disease, and (3) complex or recurrent pilonidal disease.

Pilonidal abscess

A pilonidal abscess is managed by incision, drainage, and curettage of the abscess cavity to remove hair nests and skin debris. This can be accomplished in the surgical office or in the emergency department under local anesthesia. If possible, make the drainage incision laterally, away from the midline. Wounds heal poorly in the deep intergluteal natal cleft, which allows frictional movement of one buttock over the other. The wound should be cleansed daily in the shower or with a sitz bath. Paying close attention to hygiene and hair shaving of the surrounding area are important to prevent hair from penetrating the healing scar.

This meticulous treatment of the diseased area should continue for approximately 3 months, even after the wound has completely healed. In more than 90% of cases, the wound heals completely in approximately 1 month. Incision and drainage without curettage results in wound healing in approximately 60% of patients within 10 weeks. Of these patients, 40% develop a recurrent pilonidal sinus, requiring further treatment.

Inform patients that drainage of the abscess is not a curative procedure. Some studies have shown that as many as 85% of patients require further surgical treatment. Excising the pilonidal pit at the time of abscess drainage reduces the recurrence rate to 15%. The difficulty with doing this is that the

pilonidal pit initially cannot be identified during the first drainage procedure of the abscess. Approximately 5 days later, when the edema is reduced, the pit can be identified. Often, having the patient return 5-7 days after abscess drainage to identify the pit and to excise it with a small incision is possible.

Chronic pilonidal sinus

Chronic pilonidal sinus disease is the term applied to patients with a pilonidal sinus who have had a pilonidal abscess drained. It also refers to patients with a pilonidal sinus that is associated with a chronic discharge without an acute abscess. The surgical options for management of a noncomplicated chronic pilonidal sinus include excision with primary closure, excision and laying open of the tract, wide and deep excision to the sacrum, incision and marsupialization, and phenol injection.

Excision of a pilonidal sinus entails excision of the midline pits and lateral openings down to the presacral fascia, with removal of minimal surrounding skin. In general, removing more than 0.5 cm of skin surrounding the sinus opening is not necessary. Curetting the wound to remove the hair, granulation tissue, and skin debris is essential to promote adequate wound healing. Although performing this procedure under local anesthesia alone is possible, mild sedation in addition to local anesthesia allows for a more complete excision and a more comfortable patient.

Lord and Millar popularized their technique of coring out the midline epithelial follicles, but they also included a brush in their procedure to cleanse the cored cavity of hair and any hair left over in the remaining laterally oriented granulation-lined tract. The brushing of the tracts continues in the outpatient setting in the postoperative period until the tract heals completely and closes. The follicle excision sites may be closed primarily but are usually packed and dressed to heal by secondary intention.

More recently, Bascom described using a lateral incision for entry into the pilonidal cavity. Curettage of the cavity is accomplished through this lateral incision, which is not excised. The midline pits are excised separately, including the epithelialized tube. The midline incisions are closed, while the lateral wound may be either left open to drain and heal by secondary intention or closed primarily. The advantages of a primary closure are small wounds; quicker healing time, usually within 3 weeks; minimal wound care; earlier return back to work; and no need for daily scheduled dressing changes. The obvious disadvantages are wound infection and wound dehiscence.

Rather than primarily closing a midline or lateral vertical incision, some physicians advocate the use of asymmetrical or oblique elliptical incisions in an attempt to keep incisions out of the natal cleft where wound healing is poor and to prevent unnecessary tension on the closure of the wound. The goal of

the asymmetric incision is to reduce the depth of the gluteal fold, thereby eliminating the frictional forces between the 2 opposing skin edges. Although the use of an incision that crosses the vertical gluteal fold to excise the pilonidal cavity does eliminate a vertical suture line within the gluteal fold, healing times may remain considerable.

Skin flaps have also been described to cover a sacral defect after wide excision. Similarly, this keeps the scar off the midline and flattens the natal cleft. The potential complications include loss of skin sensation in the flap, which is observed in more than 50% of patients, and necrosis of the flap edges. Again, primary healing is achieved in 90% of cases.

Excision of the pilonidal sinus and laying the tract open to allow healing by secondary intention has been described as an option to ensure that the cavity has adequate drainage. This avoids a wound infection after primary closure. Consider laying the tract open when the primary closure is not free of tension. Even after excision of the pilonidal sinus down to healthy presacral fascia, the wound is still considered contaminated. Both aerobic and anaerobic organisms are found in 50-70% of wounds. The disadvantages of laying the tract open are the inconvenience to the patient, with frequent dressing changes, and close observation of the wound to ensure proper wound healing and avoid premature closure of the skin edges. The average time for wound healing to occur is approximately 6 weeks. Laying the tract open is always appropriate when a cellulitis is surrounding the pilonidal sinus.

Primary wound closure versus wound healing by secondary intention are the 2 principal surgical options for a chronic pilonidal sinus. Differences remain between these 2 techniques in terms of wound healing and recurrence. Although primary closure has the potential for earlier wound healing if infection does not occur, it does require that the patient restrict many activities until wound healing is complete. The incidence rate of failed primary healing is approximately 16%. This is because a primary closure is rarely completely free of tension and the wound is considered contaminated despite excision and debridement. Recurrence rates after primary closure may be as high as 38%. Although excision of pilonidal disease and healing by secondary intention requires longer healing time, it is associated with a lower rate of recurrence.

Not uncommonly, wounds may require 4-6 months to heal, but on average, the healing time is approximately 2 months. The recurrence rate ranges from 8-21%. The reduced recurrence rate is felt to be due to the more broad-based, flattened, and hairless scar produced by secondary intention. This prevents buttocks friction, hair penetration, and hair follicle infection. Although advantages exist, these open wounds require aggressive management with frequent dressing changes and close observation by both the patient and the

surgeon.

Marsupialization as a treatment option of a pilonidal sinus was first introduced in 1937. Marsupialization is a compromise between primary wound closure and wound healing by secondary intention. The rationale is to avoid wound infection and dehiscence after primary closure and frequent packing of the open wound. With marsupialization, the wound is sutured open. After excision of the pilonidal sinus, cavity, and lateral tracts, the cavity is then scrubbed and curetted to remove hair and granulation tissue. The skin edges of the wound are then sutured to the presacral fascia. The wound is then loosely packed and requires daily dressing changes.

Marsupialization provides the patient with a smaller wound compared to wounds that are left open to granulate. By suturing the wound open, wound infection is prevented and the subcutaneous tissue is covered, resulting in reduced healing time. Healing is usually complete by 6 weeks, and the recurrence rate has been reported to be 4-8%. Many authors consider marsupialization the preferred method of treatment for chronic pilonidal disease because it avoids closure of a contaminated wound and combines shorter healing times with a lower recurrence rate. The patient still needs to pay meticulous attention to personal hygiene, with daily wound cleansing and frequent hair shaving and removal.

Complex or recurrent pilonidal disease

See [Complications](#) for information about surgical therapy for complex or recurrent pilonidal disease.

Follow-up care: With excision of pilonidal disease and healing by secondary intention, the open wounds left after surgery require aggressive management with frequent dressing changes and close observation by both the patient and the surgeon.

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Patients with recurrent pilonidal disease or complex unhealed pilonidal wounds present a challenge to the surgeon. Tissue loss from previous attempts at excision further complicates the surgical management and limits options. The causes of recurrence are thought to be due to an unrecognized sinus at the time of initial excision; repeated infections of the scar, causing abscess; or an intergluteal cleft anatomy that promotes the accumulation of perspiration, friction, and the tendency for hair to grow into the scar. The midline scar is the most susceptible to the recurrence of pilonidal disease and

poor wound healing.

The techniques developed for recurrent disease and unhealed wounds generally involve a flap procedure to achieve primary closure and to obliterate the deep natal cleft. This relocates hair follicles away from the midline and prevents the frictional forces associated with the principal etiological factors for the development of pilonidal disease. Reserve the use of a flap closure for complex or recurrent pilonidal disease that has failed to respond to the simple conservative operative techniques initially used to treat chronic pilonidal disease.

A wound that has failed initial therapy must be reexcised down to the sacrococcygeal fascia. The reexcision must include the unhealed wound, scar, and granulation tissue. A flap procedure is then performed to achieve primary wound closure. The techniques available include the (1) cleft closure, (2) advancement flap (Karydakis procedure), (3) local advancement flap (3-plasty rhomboid flap or V-Y advancement flap), and (4) rotational flap (gluteus maximus myocutaneous flap).

The cleft closure technique involves excising the wound using a triangular incision with the apex of the incision lateral to the apex of the natal cleft. The inferior margin becomes crescent shaped, with its point positioned towards the anus. A skin flap involving only the dermis is created on the convex side of the lower wound margin. Prior to beginning the procedure, the line of contact of the buttocks is marked to define the lateral edge of the raised skin flap. The 2 skin edges are then overlapped, and the excess skin is excised. This creates a primary closure that is off midline and obliterates the intergluteal cleft. The wound is closed in multiple layers over a closed suction drain. The recurrence rate is reported to be 3.3%.

The advancement flap or Karydakis procedure begins by excising the wound, with the sinuses removed en bloc with an elliptical specimen of overlying skin. The incision is made off midline. Once the wound is excised, a full-thickness flap is created on the opposite side of the semilateral incision. This allows the opposite side to be mobilized to allow primary wound closure, thus avoiding a midline wound. The wound is closed in multiple layers over a closed suction drain. This procedure has been used as a primary procedure for the surgical management of pilonidal disease. The disadvantage is that it is too extensive of a dissection for an outpatient setting. The recurrence rate is reported to be 1.3%.

Local advancement flaps, such as the 3-plasty rhomboid flap or V-Y advancement flap, are indeed methods of covering defects resulting from recurrent pilonidal disease. However, such flaps in the pilonidal area may be at risk for compromised vascularity due to continued infection, external compression, cigarette smoking, and tension on the flap. Accordingly,

whenever an advancement flap is contemplated, a myocutaneous flap should be considered.

Complex wounds are reconstructed using muscle and myocutaneous flaps because these flaps typically heal well and cover areas of extensive skin loss. Compared to skin flaps, these flaps are less susceptible to infection and have a predictable vascular supply that promotes safe elevation and better wound healing. These techniques are technically demanding and produce reliable results (with recurrence rates of 6-20%); however, they require prolonged hospitalization and longer operating time and are associated with more serious complications. A failed flap is a significant problem that ultimately leads to more extensive skin loss and a wound that is difficult to manage. These procedures are reserved for the surgical management of complex recurrent wounds when more conservative procedures have failed.

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In summary, the goal for treatment of pilonidal disease is 2-fold. The first is excising and healing with a low rate of recurrence. The second is minimizing patient inconvenience and morbidity after the surgical procedure and avoiding hospitalization with loss of workdays. The method used to treat the patient should satisfy these goals. A definite shift has occurred among physicians to treat these patients in an outpatient setting. A new class of proponents who support nonoperative management point out that regardless of the therapy used, the pilonidal disease resolves after age 40 years. These physicians focus their efforts on conservative medical management of the pilonidal sinus disease rather than a surgical cure of the disease.

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- Abu Galala KH, Salam IM, Abu Samaan KR, et al: Treatment of pilonidal sinus by primary closure with a transposed rhomboid flap compared with deep suturing: a prospective randomised clinical trial. *Eur J Surg* 1999 May; 165(5): 468-72 [\[Medline\]](#).
- Akinci OF, Bozer M, Uzunkoy A, et al: Incidence and aetiological factors in pilonidal sinus among Turkish soldiers. *Eur J Surg* 1999 Apr; 165(4): 339-42 [\[Medline\]](#).
- Allen-Mersh TG: Pilonidal sinus: finding the right track for treatment. *Br J Surg* 1990 Feb; 77(2): 123-32 [\[Medline\]](#).
- Clothier PR, Haywood IR: The natural history of the post anal

(pilonidal) sinus. Ann R Coll Surg Engl 1984 May; 66(3): 201-3[[Medline](#)].

- Farringer JL Jr, Pickens DR Jr: Pilonidal cyst: an operative approach. Am J Surg 1978 Feb; 135(2): 262-4[[Medline](#)].
- Solla JA, Rothenberger DA: Chronic pilonidal disease. An assessment of 150 cases. Dis Colon Rectum 1990 Sep; 33(9): 758-61[[Medline](#)].
- Sondenaar K, Nesvik I, Andersen E, Soreide JA: Recurrent pilonidal sinus after excision with closed or open treatment: final result of a randomised trial. Eur J Surg 1996 Mar; 162(3): 237-40[[Medline](#)].
- Spivak H, Brooks VL, Nussbaum M, Friedman I: Treatment of chronic pilonidal disease. Dis Colon Rectum 1996 Oct; 39(10): 1136-9[[Medline](#)].
- Stansby G, Greatorex R: Phenol treatment of pilonidal sinuses of the natal cleft. Br J Surg 1989 Jul; 76(7): 729-30[[Medline](#)].
- Taylor BA, Hughes LE: Circumferential perianal pilonidal sinuses. Dis Colon Rectum 1984 Feb; 27(2): 120-2[[Medline](#)].
- Zimmerman CE: Outpatient excision and primary closure of pilonidal cysts and sinuses. Am J Surg 1978 Nov; 136(5): 640-2[[Medline](#)].

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