

# Pilonidal sinus disease: a misunderstood problem

Pilonidal sinus disease, although relatively rare, is still poorly understood both in terms of pathophysiology or the best treatment options. The incidence is thought to be 26 per 100,000 and is 2.2 times more common in males. Morbidity is high in these young adults with a disease process exceeding 3 years. This article will, through an exploration of the literature, highlight the pathogenesis of pilonidal sinus disease, patient characteristics, presenting factors, conservative and surgical options, and management choices for the treatment of wounds healing by secondary intention.

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## KEY WORDS

Dressings  
Infection control  
Patient-focused care  
Surgery: operative  
Wounds

Pilonidal sinus disease (PSD) is a disorder of the sacrococcygeal region reported to be 2.2 times more common in males (Sondenaa, 1995). It manifests itself after puberty, presenting as an acute abscess in approximately 50% of patients or as a painful, discharging sinus (Berry, 1992). Pilonidal disease is thought to peak at 19 years of age in females and 22 years in males, with primary lesions rarely presenting after the age of 40 years. It is thought to be due to hair follicles being more susceptible to hormonal influence (Clothier and Haywood, 1984; Spivak et al, 1996).

Although pilonidal disease was first described more than a century ago (Anderson, 1847) there is still controversy surrounding its pathophysiology, with no consensus on optimal treatment (Allen-Mersh, 1990; Berry, 1992). Since the average duration

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of symptoms can exceed 3 years, many young adults are forced to endure a cycle of chronic intermittent infection and drainage, interference with activities of living and loss of income through days off work (Allen-Mersh, 1990).

## Pathophysiology

There are two theories associated with the pathogenesis of PSD — the acquired theory and the congenital theory. Adherence to one or other determines the extent of surgical resection necessary to achieve a cure (Berry, 1992).

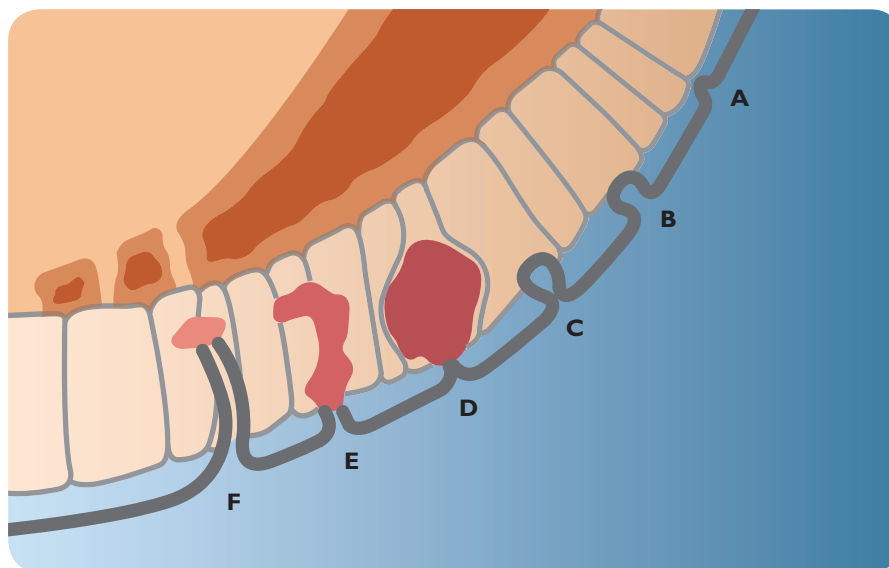
## Acquired theory

The acquired theory postulates that sacrococcygeal pilonidal infection originates in a natal cleft hair follicle that has become distended with keratin (Bascom, 1983). This follicle gets inflamed, and the resultant folliculitis produces oedema, which in turn occludes the follicle opening. The obstructed follicle subsequently ruptures into the subcutaneous fat to produce an abscess, which eventually drains on to the skin, usually via a laterally situated track overlying the sacrum. This communicating track may later be subject to epithelialisation from cells in the original follicle (Bascom, 1980) (Figure 1).

It was Hodges in 1880 who related this disease to the presence of hair, using the term 'pilonidal' from the Latin 'pilus' (hair) and 'nidus' (nest). However, pilonidal sinuses are not confined to

the natal cleft. They have also been known to occur in the interdigital space in barbers' hands (Patel et al, 1999; Uysal et al, 2003), the axilla and umbilicus (Schoelch and Barrett, 1998; Eryilmaz et al, 2005) and even in an above-knee amputation stump (Shoesmith, 1953). In such cases, hair is thought to be a secondary invader with loose hairs inserting themselves into the track, root first. This gives rise to the theory that hair can also be a secondary invader in the natal cleft with the hair being propelled further into pits or tiny openings in stretched hair follicles by the rolling action and subsequent suction effect of the buttocks (Brearley, 1955; Urhan et al, 2002). Furthermore, it is postulated that fish hook-like barbs on the hair shaft prevent expulsion of the hair, stimulating a foreign body inflammatory reaction (Page, 1969).

While PSD has been reported at variable anatomical sites, by far the most common and debilitating sinuses that present clinically are those of the natal cleft. The sacrococcygeal pilonidal sinus was branded 'jeep disease' during the Second World War because of the high incidence among jeep drivers (Buie, 1944; Bannerjee, 1999) who spent long periods travelling on rough terrain, with resultant trauma to the hair follicles. This is the reason why studies have been conducted in an army population (Mentes et al, 2006).



**Figure 1.** The sequence of events following hair insertion (hair as a secondary invader) and the infected hair follicle theory adapted from Bascom (1980). The stages of pilonidal sinus disease can be seen: a. Normal hair follicle; b. The follicle is distended with keratin, and fibrous strands suspend the follicle and skin from the sacrum; c. The distended follicle is infected and oedema closes the mouth of the follicle; d. The infected follicle ruptures into subcutaneous fat creating an acute pilonidal abscess; e. Chronic pilonidal abscess. The follicle is open at both ends and forms the mouth of the abscess. f. An epithelial tube is formed as epithelium from the regged end of the ruptured follicle grows down the wall.

#### Congenital theory

The congenital theory described by Chamberlain and Vawter in 1974 arose out of post-mortem identification of congenital tracks in children. However, the fact that the congenital tracks were situated more caudally than typical pilonidal sinus tracks and did not contain hair, would tend to discount the congenital theory (Berry, 1992). There is though a familial tendency in siblings to PSD in adolescence, secondary to obesity, hirsutism, and endocrine changes were also noted (Bannerjee, 1999).

Karydakis (1992) suggests that failure to recognise hair as a secondary invader and a belief in the congenital theory have led to surgeons performing a radical excision down to the fascia, necessitating prolonged dressing changes and frequent courses of systemic antibiotics. He also claims that wide excision facilitates further hair insertion, although this is unsubstantiated by histological evidence.

#### Patient profile

As has been stated, PSD is most prevalent after puberty. Familial disposition (38%), local trauma (34%),

being overweight (37%) and obesity (13%) are thought to be contributing factors (Sondenaa et al, 1995). Lack of personal hygiene does not appear to contribute, although where this factor has been included in patient profile questionnaires, subjects may not have wanted to admit to poor personal hygiene (Sondenaa et al, 1995; Akinci et al, 1999). Therefore, health professionals' original assumption that PSD may be related to poor hygiene (Hodges, 1880) was not based on evidence (Notaras, 1970; Akinci et al, 1999; Cubukcu et al, 2001), and this view may have stigmatised patients with PSD.

Obesity is often cited as a predisposing factor for PSD and recurrence, as the intergluteal grooves in obese patients tend to be deeper, wetter and more fragile than people of a clinically healthy weight. This is possibly because of the pull of the heavy buttocks on the sacral angle, thinning the skin and making hair insertion easier. However, studies have been inconclusive (Cubukcu et al, 2000, 2001). Some authors who have cited obesity as a factor have not defined obesity adequately (Akinci et al, 1999), and have failed to report methodology

(Karydakis, 1992) or to take into account those who have the anomaly of a naturally occurring deep gluteal sulcus which cannot be attributed to obesity (Bozkurt and Tezel, 1998). A more recent study (Arda et al, 2005) measured the body mass index (BMI) in 14 children presenting with PSD (aged 14–18 years) and found that eight were obese. However, such a small study may indicate that obesity is a contributing factor but is not conclusive.

#### Presenting factors

Approximately 50% of all patients who present with an acute abscess go on to develop the chronic disease (Lundhus and Gottrup, 1993; Sondenaa et al, 1995). Acute pilonidal disease is, typically, accompanied by moderate to severe pain, with swelling in the natal cleft or lower back (Bannerjee, 1999), whereas those with chronic symptoms present with intermittent pain and a discharging sinus (Berry, 1992).

The acute phase of the disease necessitates immediate intervention, whereas chronic disease is associated with considerable morbidity, with reports of duration of chronicity ranging on average from 2–4 years (Sondenaa et al, 1995; Senapati et al, 2000; Seleem and Al-Hashemy, 2005; Mentis et al, 2006). During this time patients will experience multiple episodes of drainage and surgical treatments (Bozkurt and Tezel, 1998; Dylek and Bekereciolu, 1998).

#### Conservative interventions

For minor symptoms such as intermittent pain and discharge, Berry (1992) suggests conservative treatment such as regular bathing, shaving the surrounding skin and oral erythromycin and metronidazole, since both anaerobes and aerobes are present on the skin. A more modern approach is laser epilation (Landa et al, 2005). The injection of phenol into non-infected sinuses has had varying results, with reported recurrence rates of 9% (Maurice and Greenwood, 1964), 19% (Shorey, 1975) and 40.5% (Schneider et al, 1994). This practice, which needs to be repeated several times, appears to be diminishing, perhaps because of the associated pain and the protracted nature of the treatment.



**Figure 2.** Wound healing 12 weeks post-wide excision and primary closure in midline which subsequently broke down and is now healing by secondary intention.

However, a more recent study of 41 patients (Dogru et al, 2004), using two to three applications of crystallised phenol, reported recurrence rates of only 5% after 24 months.

### Surgical interventions

Many surgical techniques have been advocated for PSD. The acute pilonidal abscess requires incision and drainage with a second procedure to excise the pits which should be carried out once the inflammation and oedema have subsided (Bascom, 1983), thus allowing for easier identification of the pits. However, in practice, this seldom occurs, with drainage and excision taking place in the one procedure perhaps because drainage and a later excision would necessitate two operations. Bascom and Bascom (2002) found that in 31 cases of surgery for PSD, 5 patients did not have the original pit removed.

Procedures which appear to result in faster healing rates are excision and primary closure in the midline (Kronborg et al, 1985; Bissett and Isbister, 1987), or excision and asymmetric closure (Bascom, 1990; Senapati et al, 2000). Asymmetric closure produces less tension on the wound than midline closure and therefore a decrease in wound dehiscence (Bascom, 1990; Senapati et al, 2000). Opponents of these methods cite infection as a reason for advocating wide excision and healing by secondary intention (Patel et al, 1999; Miller and Harding, 2003).

Two researchers (Patel et al, 1999; Testini et al, 2001) conducted prospective randomised, controlled trials comparing the closed Karydakis technique and wide excision left to heal by secondary intention, with both reporting faster healing rates using the closed method. However, the study by Testini et al excluded all acute episodes, and recurrent and extensive PSD and therefore may not reflect the heterogeneity of the actual pilonidal sinus population.

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Morden et al (2005), in a retrospective study of 68 patients with PSD (mean age 15 years), found lower recurrence rates and complications in those patients undergoing the Karydakis procedure (where an asymmetric subcutaneous flap obliterates the anal crease) compared to midline excision, although statistical significance was not reached.

For refractory pilonidal disease, Bascom and Bascom (2002) advocate a cleft lift procedure where intact skin is drawn over the cleft reducing cleft

depth and bringing the suture line off the midline, thus reducing the tension on it. The authors argue that the initial problem is not in the deep tissues but in the epidermis. The more shallow cleft will deny anaerobic bacteria the moisture and depth they require to thrive and thereby prevent skin breakdown and subsequently re-epithelialisation. This challenges the belief that the problem originates in the deep tissues.

The rhomboid excision and Limberg flap is another surgical intervention usually reserved for recurrent or refractory PSD. The aim of this procedure is to flatten the natal cleft and abrogate the suction generated by buttock friction (Urhan et al, 2002). Akca et al (2005) compared 100 patients undergoing excision and primary closure and 100 undergoing rhomboid excision and Limberg flap. They found that levels of postoperative pain were less in the latter group, while duration of hospital stay, and time to mobilisation and resumption of work was shorter ( $P < 0.001$ ). Follow-up at 28 months detected no recurrence in the Limberg flap group but 11 patients in the primary closure group experienced recurrence. Ertan et al (2005) report similar findings, and also statistically significant differences in general health perceptions and social functioning in favour of the Limberg flap.

### Recurrence rates

Recurrence rates are not easy to measure, particularly where the surgical intervention has been by wide excision, as it is difficult to decide if there is infection in the unhealed wound or if a new pit has formed. Recurrence rates for wide excision vary from 13% (Spivak et al, 1996) to 10% (Notaras, 1970), while another procedure, marsupialisation (where the cut edges of the skin are sutured to the base of the excised pilonidal sinus), has a reported 6% recurrence rate (Solla and Rothenberger, 1990; Surrell, 1994; Spivak et al, 1996). Asymmetric closure, as practised widely by Karydakis (1992), has a 1% recurrence rate. The use of differing time spans for follow-up and the fact that a young population tends to move around making it difficult for researchers to stay in contact are other reasons why comparison of recurrence rates is unreliable.





**Figure 3.** Pilonidal wound 15 months after initial surgery (further wide excision was carried out 9 weeks before this photograph was taken) and now shows unhealthy granulation tissue with pocketing. The pocketing was released and systemic broad-spectrum antibiotics and metronidazole given. Healing was eventually achieved at 15 weeks post-second surgery.

### Wound management

Since the anal area is well perfused it should be expected that wounds in that region would heal quickly and many do (Bascom and Bascom, 2002). However, wound healing after wide excision for pilonidal disease can take longer than 8 weeks (Figure 2) and is often complicated by infection due to the aerobic organisms regularly found in the natal cleft (Marks et al, 1987; Bascom and Bascom, 2002).

Anaerobes are not always recognised as being detrimental to wound healing (Bowler et al, 2001) but the synergy between these and aerobes can reduce tissue oxygen tension, which in turn reduces the killing capacity of polymorphonucleocytes (PMNs), thus creating a cycle of infection (Hunt and van Winkle, 1976). There are reports of wounds still unhealed at 210 and 259 days (Marks et al, 1983) and in the author's experience two patients have had open wounds in excess of 365 days, possibly as a result of clinicians not recognising this cycle of infection.

Marks et al (1985) recommend that a flexible approach should be employed in the detection and treatment of

infected pilonidal sinus excisions. In other words an awareness of the effect of infection in delaying healing should alert the clinician to the need for more frequent sampling for organisms and sensitivities and the use of systemic antibiotics when topical antimicrobials have failed. Their recommendations are based on a prospective study of 100 patients who were placed in three consecutive groups: group one received standard wound care and no oral metronidazole; group two received standard wound care plus oral metronidazole 400mg three times a day for two weeks commencing 7–14 days postoperatively; and group 3 received standard wound care plus a flexible approach to oral metronidazole based on bacteriology results and the clinical appearance of the wound bed.

Healing rates in the flexible group were significant when compared to untreated cases ( $P < 0.001$ ), but were not significant when compared to group 2. This may be accounted for by the fact that 48% of patients in the flexible group did not require any antibiotics. As well as indicating the benefits of a flexible approach to the management of pilonidal wounds, this seminal study

demonstrated a strong correlation between the appearance of the wound bed (Figure 3) and bacteriological findings (Cutting and White, 2005). However, bacteriological results can prove negative in spite of the appearance of unhealthy granulation tissue. This may be as a result of poor sampling technique, difficulty in sampling anaerobes, which prefer to live in deep tissue, death of anaerobes as a result of delays in transportation, particularly in primary care settings, and laboratory culture techniques (Gilchrist and Reed, 1989).

It must be taken into account when deciding treatment that the use of systemic antibiotics may disrupt the lifestyle of some young adults since alcohol is not recommended while on antibiotics such as metronidazole. Alcohol can reduce an antibiotic's efficacy and not being able to drink may cause non-concordance with antibiotic treatment.

### Topical antimicrobials

Antimicrobial is a broad term used to describe antibiotics and antiseptics, the former discouraged for topical use as bacteria can develop resistance rendering the antibiotic ineffective against certain strains (Cooper and Molan, 1999). Where the term antimicrobial is used in this article, it refers to topical antiseptics. The use of topical antimicrobials in unhealed pilonidal wounds is not proven. However, antimicrobials such as povidone iodine and the silver preparations may well reduce the bacterial burden sufficiently to allow healing to proceed (Lawrence, 1999) since bacteria produce endotoxins (substances toxic to healing tissue) and increased metalloproteinases (MMPs). These in turn are thought to inhibit growth factors such as keratinocyte growth factor (KGF), which are essential for epithelialisation (Mast and Schultz, 1996).

Silver dressings may provide some benefit. However, with the frequency of dressing change in this patient group (usually daily), some silver dressings, particularly those with a slow sustained release may not prove cost effective since they are designed to be left in place for



more than one day. Other silver dressings may not release enough silver to be effective in critically colonised wounds (Thomas and McCubbin, 2003).

Furthermore, with bacteria penetrating the depth of the wound topical antimicrobials may not penetrate far enough to be effective hence the need for systemic antibiotics (Sibbald et al, 2006).

### Dressings

To date there is no evidence to suggest that one dressing product is superior to another in terms of healing rates in wounds healing by secondary intention (Berry et al, 1996; Viciano et al, 2000). In the Viciano et al (2000) study, pain was a problem for the control patients treated with gauze dressings because of adherence of the product to the wound bed. Silicone foam dressings have the advantage of being easy to use by patients who self-care but require twice-daily disinfection (Marks et al, 1985), which is not always practical for busy young adults.

An ideal dressing for patients with pilonidal wounds healing by secondary intention would be one that absorbs exudate, prevents leakage, is easy to apply and atraumatic on removal.

It should be noted that wounds created by wide excision should not have any tunnels or pockets therefore they do not require packing where wounds are filled with ribbon or rope dressings. If a pocket or tunnel is present as in *Figure 2* the patient should be referred to a medical practitioner and the pocket released or the tunnel investigated.

Stevens and Chaloner (2005) report on the use of a dressing comprising calcium alginate fibres and hydrocolloid in the management of two pilonidal wounds of 18 months' and two weeks' duration and report healing in three weeks. However, it is not clear from the study report if other adjuncts to healing such as topical antimicrobials or systemic antibiotics were used. However, since this is a report on only two wounds, firm conclusion cannot be drawn as to the efficacy of the dressing in this instance.

Some young adults with wounds healing by secondary intention report that they stop participating in sport as they are fearful that the dressing will become dislodged or that sweating will encourage infection (Bradley, 2005). It is, therefore, imperative that they are encouraged to self-care as this will empower them to carry on with normal activities such as sport, work commitments and study, and enable them to shower frequently and apply dressings confidently.

Another important factor when considering wound care products is shaving the surrounding skin so that adhesive dressings will adhere adequately and pain on dressing removal will be minimal.

### **Chronic PSD, although relatively rare, would still appear to be poorly understood both in terms of pathophysiology or the best treatment option.**

Lynch et al (2004) report on the use of vacuum-assisted closure (VAC) as an alternative treatment for pilonidal wounds healing by secondary intention, citing three cases where VAC was applied for 4 weeks and resulted in healing at 8 weeks. This may indeed be a useful adjunct or alternative for recurrent cases of pilonidal disease, although one must also consider the disadvantage of such a visible system of wound healing disrupting lifestyle.

### Patient satisfaction

Only one study reported on patient satisfaction with regard to outcomes in terms of scarring (Sondenaa et al, 1995). The reason for this omission in other studies is unclear but it may be that health professionals see PSD as self-limiting, hidden for the most part from view and, although a nuisance, not life-threatening. However, PSD can be the cause of much morbidity, inconvenience and interruption of daily activities at a time when many young adults are embarking on careers, tertiary study or engaging in sporting activity.

### Discussion

Although the range of surgical interventions has expanded over the years there is no clear indication from the literature of how surgeons decide which type of surgical intervention to employ. Furthermore, comparison of treatments is difficult because of various methodological flaws such as the use of retrospective studies, variations in sampling and patient presentation.

Chintapatla et al (2003) suggest that the choice of surgical approach depends on the surgeon's familiarity with the procedure and perceived result in terms of healing and recurrence rates. Failure to agree terminology and the wide range of time frames used to measure recurrence also make comparisons difficult (Allen-Mersh, 1990). However, for patients, the choice would probably be the procedure that is least inconvenient in terms of hospital stay, days off work, time to healing and recurrence rates and has the least impact on quality of life.

### Conclusion

Chronic PSD, although relatively rare, would still appear to be poorly understood both in terms of pathophysiology or the best treatment option. Bascom and Bascom (2002) suggest that the source of the disease is not in the deep tissues and therefore question the need for excision to fascia. Rhomboid excision and Limberg flap would appear to offer faster healing and lower recurrence rates but are often reserved for patients with problematic pilonidal disease either in terms of chronicity or failure to heal following excision (Ertan et al, 2005).

While excision and midline or asymmetric closure appear to offer faster healing rates than wide excision to fascia, recurrence rates may be higher; however, the retrospective nature of studies and failure to blind investigators make it difficult to compare outcomes. Wide excision and healing by secondary intention is advocated by Miller and Harding (2003) as the optimum surgery for chronic pilonidal disease. However, it leaves the young person with an open wound in an anatomical area that is

**Key Points**

- ▶▶ Pilonidal sinus disease predominately affects young adults and can result in 2–3 years of a chronic discharging sinus in the sacrococcygeal region.
- ▶▶ The pathophysiology is poorly understood but is thought to result from an infected hair follicle or the insertion of a loose hair into a pit or small opening in an existing hair follicle.
- ▶▶ Surgical options range from wide excision to fascia with a wound left to heal by secondary intention, excision with primary closure or various flap procedures to obliterate or reduce the depth of the natal cleft.
- ▶▶ The nurse's role is often to manage unhealed wounds due to the bacteria friendly environment of the natal cleft.
- ▶▶ A sound knowledge of the physiology of wound healing, the role of bacteria and subsequent treatment is therefore required if healing is not to be protracted and quality of life adversely affected.

a fertile breeding ground for bacteria, thus necessitating a flexible approach to systemic antibiotic therapy if healing is to be achieved in a reasonable time frame. A flexible approach to systemic antibiotic therapy has demonstrated good results in healing times and should be considered for wounds that are slow to heal (Bascom and Bascom, 2002; Marks et al, 1987).

There is no evidence to support the use of one dressing type over another, but consideration should be given to the lifestyle of this patient group. The promotion of self-care necessitates

the use of dressings that are secure and leak-proof, protect the wound bed and are atraumatic on removal. Clearly, a better understanding of the pathophysiology of the disease and a more co-ordinated approach to research are required if patients are to be given realistic options enabling them to make informed choices.

**Nurses who have responsibility for the wound care of these patients need to have a sound understanding of the wound healing process and factors that delay healing, such as infection.**

Nurses who have responsibility for the wound care of these patients need to have a sound understanding of the wound healing process and factors that delay healing such as infection. A team approach should also be adopted with access to the G/P and the hospital consultant so that treatment can be better co-ordinated. Cognisance also needs to be given to the effects of an open wound and frequent dressing changes on the lives of young adults causing unnecessary and protracted negative effects on quality of life. **WUK**

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