

Managing Wound Sinuses

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Sinuses are associated with high rates of recurrence, but information on management methods is limited. Martyn Butcher reviews the main areas for consideration

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The drainage of significant levels of fluid from a wound always raises the question of its origin. High levels of exudate result from infection or bacterial colonisation, the presence of necrotising tissue or underlying medical conditions, such as congestive cardiac failure.

Development of a wound sinus

A wound sinus is a discharging blind-ended track that extends from the surface of an organ to an underlying area or abscess cavity (Everett, 1985). The track is invariably lined with granulation tissue. In chronic cases this may be augmented with epithelial tissue. Despite the myriad of clinical presentations of wound sinuses, there are three basic mechanisms of sinus formation (Davis et al, 1992).

Infection

Probably one of the commonest causes of sinus track formation is the presence of underlying infection (Davis et al, 1992). The multiplication of bacteria within tissues leads to the formation of an abscess cavity. This may rupture spontaneously or may require surgical incision and drainage. Although such abscess cavities most frequently arise from cutaneous pathogens, they may also result from infections in deeper structures, such as chronic osteomyelitis. Although less common in recent years due to the development of new generation antibiotics and revised orthopaedic techniques, the development of chronic sinuses is still seen in some patients following infections around joint prostheses. Conditions such as tuberculosis of the cervical glands or chronic empyema may also present in a similar fashion.

Infections within the cutaneous tissue can have a multitude of presentations. Hidradinosis, an abnormality of the apocrine sweat glands leading to a predisposition to blockage of the glands and to skin abscess and sinus formation in the axilla, groin and perineum, is one such presentation (Davis et al, 1992).

Liquefaction

The natural breakdown of dead tissue following blunt trauma or tissue ischaemia will produce a sterile discharging wound. Deep pressure damage may present in this way.

Avascular damage may also result from some surgical procedures. Undermining of large amounts of

adipose tissue occasionally compromises its blood supply, leading to fat necrosis. Procedures particularly prone to this phenomenon include abdominal surgery on people who are morbidly obese, abdominoplasty and breast reduction.

The presence of extensive bleeding within tissues and formation of localised haematoma can also cause damage to adjacent tissue due to the development of high pressure and subsequent ischaemia within tissue groups. The developing clot separates tissue planes as bleeding continues, and forces are exerted throughout the soft tissues.

In deep tissues, re-absorption may occur uneventfully. However, if damage is more superficial or extensive, breakdown of the tissues is likely. The haematoma liquefies, revealing a cavity with one or more sinuses. Once skin integrity is lost, secondary colonisation and infection are likely to occur.

Foreign body

Many tracks fail to heal and become chronic problems. This is frequently due to the presence of foreign material, such as hair (as in the case of pilonidal sinus) in the base of the abscess. Iatrogenic causes may include retained non-absorbable suture material, cottonwool fibres or gauze, or may be the result of incomplete cleansing following penetrating trauma. Splinters of wood, metal and glass have all been frequently found in the base of recurrent abscesses (Everett, 1985).

Assessment

The management of a sinus will depend on its underlying aetiology. Treatment should be based on sound assessment. A full patient history will be of great assistance in determining the likely cause of the sinus. Significant factors include the following:

- Occupation (sedentary lifestyle increases risk of pilonidal sinus);
- Previous abscess formation (high rate of recurrence in foreign body sinus);
- Previous surgery at or near the site (possibility of retained material);
- Recent blunt trauma (possible haematoma or ischaemic changes);
- Recent history of immobility or increasing dependence (possible occult pressure sore).

A thorough examination of the wound is essential to observe the condition of the surrounding tissue for signs of maceration, excoriation and cellulitis. The nature of the exudate, its volume, colour and consistency should also be noted. Finally, the sinus should be gently explored with a fine malleable probe to assess depth, direction and multiplicity of the tracts present. Soft polythene catheters are increasingly replacing traditional silver probes for this task. Cotton-tipped swabs and applicators should be avoided when probing the wound to avoid the risk of leaving cotton fibres in the depths of the sinus.

Drawing the wound dimensions and direction on to the surface of the skin will result in a wound map showing the extent and direction of the various tracks. This helps to visualise the extent of the problem and to record the wounds progress.

All sinuses should initially be swabbed and a specimen sent for culture and sensitivity. While most will be colonised by skin flora or gut commensals, occasionally a specific causative organism, such as tuberculosis, actinomycosis, or fungosis, may be found (Cuschieri, 1995). Subsequent sampling is unnecessary in the absence of any signs of acute infection.

Where bony involvement or infection is possible, plain X-ray examination is recommended. This is of particular importance in foot sinuses in diabetic patients, where underlying osteomyelitis is a risk. The instillation of radio-opaque dye (sinogram) may sometimes be necessary to assess the extent of the sinus, particularly in deep wounds. This may also be necessary to exclude the presence of occult fistulae (Everett, 1985).

Treatment options

Treatment regimes must be based around removal or treatment of the causative factor. Many simple acute sinuses can be treated conservatively with dressings that encourage the granulation of the cavity and track. However, for a persistent or recurring sinus the surgical laying-open of the wound may be the best option.

A common cause of persistent sinus is the inability of the abscess cavity to drain adequately, either due to the shape of the track or the size of the sinus itself. The abscess cavity therefore fills with serous exudate, debris and pus, providing an ideal area for bacterial proliferation (Vickery, 1996). Opening the cavity prevents bridging of the wound edges and permits adequate drainage.

Where there are multiple tracks, as in hidradenitis, wide excision of the affected area is the recognised treatment. All foreign and infected material is removed from the wound bed and a biopsy should be taken. Although on histological examination this normally shows granulation tissue, it is necessary to exclude malignant disease or inflammatory conditions such as Crohn's disease (Cuschieri et al, 1995). Following surgery it is essential that the correct dressing regimen is used to prevent further sinus formation.

The use of negative pressure therapy (VAC) to treat cavity wounds has offered a new option in the treatment of wound sinus (Mendez-Eastman, 1998; Joseph et al, 2000). This can be used to manage larger cavities with tracking sinuses, or following surgical opening or excision of a sinus track. The system facilitates the drainage of exudate and promotes the formation of new granulation tissue. The presence of the foam matrix within the wound prevents premature epidermal closure and so prevents bridging that might otherwise lead to recurrence.

Cleansing

In order to prevent accumulation of exudate and pus in the wound it is necessary to irrigate the area regularly. Before surgical intervention this will remove debris from the track and abscess cavity and remove debris from around the sinus opening that might prevent free drainage. This is best achieved by gently instilling sterile saline with a syringe. High-pressure irrigation can cause pain, bacterial spread (Lawrence, 1997) and may damage body defences (Wheeler, 1976).

The role of antiseptics in the irrigation of sinuses has yet to be established. Lawrence (1997) argued that, although many have a positive effect on the bacterial loading of intact skin, there is little

evidence that they have a therapeutic effect on colonised wounds. However, povidone-iodine preparations may be of benefit due to their action on a wide range of organisms.

Hydrogen peroxide should **never** be used to irrigate a sinus, as the rapid release of oxygen in the wound can cause air embolism (Doughty, 1992).

Primary dressings

The wound sinus dressing aims to prevent adherence of the wound edges and therefore stop premature closure. Although used for many years to pack sinuses, ribbon gauze is now not recommended, as tight gauze acts as a bung that prevents free drainage of exudate (Everett, 1985). Alginate dressings can be a useful option in this type of wound care (Miller et al, 1993; Morison, 1992), as they can absorb moderate to high levels of exudate, are relatively easy to apply and cause minimal trauma on removal. However, it is essential that all of the material is removed at dressing changes, as cases of giant cell foreign body reaction have been reported where alginate dressings have been retained (Berry et al, 1996).

Hydrofibre dressings, such as Aquacel, can be a useful alternative to alginates, as they absorb similar fluid levels but gel more readily, making dressing product retention less likely. In addition, some clinicians have found that they can enhance the production of granulation tissue in indolent wounds. Their findings have been publicised at international conferences in poster presentations, but to date little has been published in peer-reviewed publications. This is therefore an area which needs further investigation.

An alternative to packing may be the use of amorphous hydrogels (Dealey, 1989; Ricci et al, 1996). These can easily be introduced into the sinus via the applicator tip or a syringe. They can absorb a certain amount of exudate but, more importantly, can maintain a moist environment, thereby facilitating autolysis, and are easily removed by irrigation.

Secondary dressings

Owing to the high level of moisture and the potential for contamination or infection, occlusive dressings are not recommended. Simple non-adherent dressings with absorbent padding may be suitable, depending on the area of the body involved. In areas such as the perineum these can be held in place with disposable pants and are easily replaced as necessary. Alternatively, where exudate is lower or aesthetics are a higher priority, absorbent foam dressings may be more suitable. Generally, Gamgee roll is not considered acceptable. Cotton fibres in its composition are very prone to shedding into the wound and it tends to become sodden very quickly, leading to peri-wound maceration.

High levels of exudate and the prolonged use of hydrogels can lead to epidermal breakdown, and careful management of this tissue is necessary to prevent further complications (Cutting, 1999). The prudent use of barrier creams can protect tissue but may diminish the absorbency of any secondary dressing. The recent development of alcohol-free liquid barrier films has offered greater opportunities to protect the surrounding tissues (Hampton, 1998).

Some wounds, notably very deep ones, are difficult to manage, as the cavity is large and the opening relatively small. In these cases poor drainage is common. Such wounds are best managed by the insertion of a tube drain or stud-type grommet. Drains can be progressively shortened as granulation

of the wound bed occurs.

The recent introduction of capillary action dressings, such as Drawtex and Vacutex, have provided an alternative to drainage tubes. These materials can transport exudate into a secondary dressing or drainage bag. They can be trimmed down to the appropriate width to match the aperture of the sinus and do not shed fibres in the wound (Deeth and Pain, 2001).

Once excision or laying-open of the sinus has been undertaken, dressings are chosen which prevent the rapid closure of the epidermis while encouraging granulation for the wound bed. Elastomer dressings, such as Cavi-care, have been found to be of great benefit in this approach (Wood, 1977).

Conclusion

Sinuses are frequently seen in wound care, yet there is little generic information available on their management. Recurrence rates remain high, often as a result of incomplete assessment or the use of inappropriate dressing techniques that prevent the drainage of exudate and allow the formation of epidermal bridges. An understanding of wound aetiology and the conditions required to effect successful management and resolution will aid treatment.