

SURGICAL WOUNDS:

WHY DO THEY DEHISCE?

Dehiscence is when surgical wounds open up and do not heal in a regular way. It is important that these wounds are assessed properly and the cause of the dehiscence identified and managed. This article outlines common causes of dehiscence and suggests how practitioners can accurately assess surgical wounds and plan care for postoperative patients.

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Surgical wounds do not always heal in a routine way and complications can delay the course of healing. When a surgical wound does not heal, it is important to fully assess the wound and the patient in order to identify the causes of the breakdown of the healing process. This article looks at the main reasons that surgical wounds do not heal and suggests a plan of care for patients with postoperative wounds.

Surgical wound assessment

The clinician with the duty of care for postoperative patients should ensure that a full history and assessment of the wound and the patient is obtained (*Table 1*). This will help predict the likelihood of complications arising and provide an indication as to the expected progress of the wound (Miller and Glover, 1999).

Surgical wounds can be classified as clean, clean contaminated, contaminated and dirty (Berard and Gandon, 1964) (*Table 2*). The risk of postoperative

Table 1.

Surgical wound assessment: what to include

Patient history	<ul style="list-style-type: none"> When the surgery took place, what type of procedure it was and why the patient needed surgery How acutely or chronically ill the patient was before and after surgery Whether there were any complications during surgery The patient's ability to heal postoperatively (do they have an adequate blood supply, adequate nutrition, anaemia?)
Wound healing potential	<ul style="list-style-type: none"> Medical, social and psychological history Nutritional status and body mass index (BMI) Blood biochemistry (if their haemoglobin or albumin levels are low then their ability to heal may be affected) Clean/contaminated assessment (<i>Table 2</i>)
Wound assessment	<ul style="list-style-type: none"> The approximate length of the wound Whether there are normal signs of wound healing (inflammation 3–7 days postoperatively) What material has been used to close the wound Whether there are any signs of complications such as infection, wound breakdown (dehiscence) or haematoma Pain levels Exudate levels Condition of the surrounding skin

complications such as wound dehiscence is increased if the wound or procedure is classified as contaminated or dirty.

Management of uncomplicated surgical wounds

Wound healing in the majority of acute surgical wounds will occur by primary closure. The surgeon will approximate the wound edges and facilitate closure with sutures, staples, wound adhesive or adhesive paper strips (Moore and Foster, 2002; Aindow and Butcher, 2005).

Wounds that heal by primary intention should be left covered for the first 48 hours and will normally seal and dry out within this period (Dealey, 2005; Singer and Hollander, 2003). These wounds will usually heal within eight to 14 days depending on the type of surgery. Healing should coincide with the removal of clips or staples. Clinicians should use this as a baseline to compare and identify abnormal healing patterns and subsequently adapt their care plan accordingly.

Low-adherent postoperative dressings or semi-permeable film dressings are usually used for uncomplicated surgical wounds (Dealey, 2005). Semi-permeable postoperative dressings are particularly useful if the area is at risk of cross-contamination, which is usual with wounds in the groin or perineal region, or if significant postoperative swelling such as in a knee or hip wound is likely to develop. Semi-permeable dressings provide a waterproof and bacteria-proof barrier. Unlike low-adherent postoperative island dressings, film dressings tend to be more stretchy, making them an excellent choice for areas where postoperative blistering could be a problem, such as hip or knee surgery, and they have been shown to actually reduce the incidence of blistering (Leal and Kirby, 2008; Morris, 2008).

Recent guidance from the National Institute for Health and Clinical Excellence (NICE, 2008) has recommended the use of an 'interactive dressing' for postoperative wounds by using an advanced wound care product such as a semi-permeable island film dressing or hydrocolloid dressing, rather than a low-adherent postoperative island dressing.

Most postoperative wounds will not require cleansing within the first 48 hours. After 48 hours the patient can bathe and shower and the wound can be left exposed as long as it is dry and sealed (Pudner, 1997; Mangram et al, 1999). However, there is some evidence to suggest that patients experience less pain when a dressing is left in

Table 2.**Surgical wound types****Clean**

- » Elective, not emergency, non-traumatic, primarily closed
- » No acute inflammation
- » No break-in technique
- » Respiratory, gastrointestinal, biliary and genitourinary tracts not entered

Clean – contaminated

- » Urgent or emergency case that is otherwise clean
- » Elective opening of respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage (e.g. appendectomy) not encountering infected urine or bile
- » Minor technique break

Contaminated

- » Non-purulent inflammation
- » Gross spillage from gastrointestinal tract; entry into biliary or genitourinary tract in the presence of infected bile or urine
- » Major break-in technique
- » Penetrating trauma <4 hours old
- » Chronic open wounds to be grafted or covered

Dirty

- » Purulent inflammation (e.g. abscess)
- » Pre-operative perforation of respiratory, gastrointestinal, biliary or genitourinary tract
- » Penetrating trauma >4 hours old

place for longer (Briggs, 1996; Pudner, 1999). Patients often feel more comfortable with their wound being covered because it prevents clips being caught on clothing and causing any trauma. If cleansing is required within the first 48 hours because of excessive wound drainage, this should be undertaken using an aseptic technique and warmed, sterile normal saline.

Wound dehiscence

There are some acute surgical wounds that will not heal in a routine way and may dehisce (open up). Dehisced surgical

Table 3.**Common causes of dehiscence of surgical wounds**

- » Infection
- » A failure to achieve haemostasis with subsequent haematoma development
- » Poor nutritional intake
- » Excessive exudate caused by an infection or localised oedema
- » Poor quality vascular supply caused by a chronic or acute medical condition, an emboli, oedema, anaemia, obesity or smoking
- » Mechanical stress on the wound caused by patient movement, obesity, oedema or localised pressure

wounds are classified as wounds that were originally closed with sutures, staples, tissue adhesives or adhesive paper strips, but have since opened up to reveal the wound cavity (Dealey, 2005). There are a number of reasons why a wound may spontaneously dehisce. The clinician caring for the patient should assess which of these factors is the likely cause of the dehiscence and attempt to rectify the problem to ensure that it does not continue to affect the potential for the wound to heal.

Patient and wound assessment following postoperative wound healing complications

There are a number of reasons why a wound may start to dehisce, some of which are more common than others (Burton, 2006). *Table 3* outlines the most common causes of dehisced wounds, and these will be discussed in more depth later.

Wound dehiscence can either be partial involving only the superficial layers of the skin, or a complete dehiscence involving deeper tissues, and may even involve exposure of the small

Table 4.**Preventing surgical site infection (NICE, 2008)****Preoperative prevention**

- » Length of preoperative stay (patients being admitted for planned elective surgery should be admitted as close to the date of surgery as possible to reduce the risk of infection)
- » Optimal hand hygiene
- » Prophylactic antibiotics should always be given for clean-contaminated, contaminated and dirty/infected wounds. They should be administered intravenously on commencement of anaesthetic
- » Hair removal using clippers not razors
- » Adequate nutrition and hydration
- » Preoperative infection screening
- » Patient information

Perioperative prevention

- » Hand hygiene
- » Appropriate theatre wear — masks/gowns/gloves
- » Skin preparation
- » Wound irrigation
- » Wound closure techniques (if the sutures are placed too tightly, they can place undue tension on the wound and have the potential to cause tissue necrosis)
- » Temperature regulation
- » Glucose control

Postoperative prevention

- » Hand hygiene
- » The use of drains in or in close proximity to the wound will keep the wound or skin open and so be vigilant about the increased risk of bacterial contamination
- » Use of interactive dressings changed under aseptic technique
- » Debridement of open wounds
- » Recognition of infection and appropriate use of antibiotics
- » Postoperative management of wound dehiscence
- » Give out clear patient information about reducing the risk of infection

or large bowel in the case of a dehiscid abdominal wound (Pudner and Ramsden, 2000).

Ideally there should be an attempt to address any factors that will affect wound healing, such as nutrition, smoking and anaemia, before the patient has the operation. NICE (2008) have

highlighted the importance of adequate patient information as well as a number of other key interventions as a means of reducing the risk of surgical site infections (*Table 4*). This guidance should be used in clinical practice by those caring for surgical patients to reduce the chance of postoperative dehiscence due to infection.

If wound dehiscence does occur, wound healing will obviously be delayed because the size and surface area of the wound will have increased, and so there will be a larger void to be filled with healthy granulation tissue. Once the likely cause of the dehiscence is identified and managed, the practitioner needs to focus on using objective measures to assess the status and progress of the wound (*Table 5*). If wound healing is the goal, the care plan should utilise the principles of moist wound healing to facilitate cellular proliferation. Occasionally a wound may not have a goal of healing, e.g. if the patient does not have an adequate blood supply or is being cared for on the end of life care pathway. In these cases the principles of moist wound healing may not be appropriate.

Common causes of wound dehiscence

Wound infection

Postoperative wound infection (*Figures 1 and 2*) is a significant problem as it will lead to a delay in wound healing and potential wound breakdown (Miller and Glover, 1999). It also represents a significant cost to the NHS and can potentially increase the length of stay for the patient. The mean additional cost of a patient developing a wound infection is

Table 5.**Assessing the status and progress of a dehiscid wound****When assessing the wound note the following:**

- » Anatomical position of the wound and type of surgery performed
- » Wound dimensions (in cm) supported with photography, tracings, rulers, or digital wound tracking
- » Type of tissue in wound bed (necrotic, sloughy, granulation, epithelial) and other structures or materials (sutures, bone, tendon, haematoma, metal work)
- » Exudate level and type
- » Level of pain using an appropriate measurement tool
- » Odour and likely cause of odour (such as necrosis, infection)
- » Signs of infection (spreading erythema, pyrexia, pus, increased pain)
- » Condition of surrounding skin (oedema, erythema, maceration, excoriation)

thought to be £280 (Plowman et al, 2001). Practitioners caring for surgical patients should observe the wound for the early signs of wound infection which are redness (erythema) spreading from the wound edges, increased pain, pyrexia (Kingsley, 2001) and a raised white cell count.

Postoperative wound infection can result in a small, superficial dehiscence of the wound right through to extensive dehiscence (Cooper et al, 2005). The patient can be acutely unwell resulting in intravenous antibiotics, surgical or sharp debridement, a return to theatre, significant delay in wound healing and potential body image issues due to extensive scar tissue formation.

If the clinical signs of a wound infection are present the practitioner should ensure that antibiotics are commenced and a wound swab (or more



Figure 1. Methicillin-resistant *Staphylococcus aureus* (MRSA) infection following cardiac surgery. This wound has clear signs of infection shown by the erythematous area surrounding the dehisced wound and the purulent appearance of the exudate.



Figure 2. Dehisced laparotomy wound with deep tension sutures visible and bilateral drain sites necrosed due to wound infection.

preferably a sample of pus if available) should be obtained to identify the causative bacteria. A wound should not be swabbed unless clinical signs of infection are present or routine screening processes are required. This is because wound swabs will identify the presence of bacteria in the majority of wounds, however, antibiotic treatment is only necessary if this bacteria is affecting the wound healing and clinical signs of infection are present (Kingsley, 2001; Bale et al, 2000).

Haematoma

A haematoma is a collection of clotted blood present under the skin outside the blood vessels which develops following trauma or surgery. The development of a haematoma (Figure 3) can often be identified by a hard, raised area under a suture line. Haematomas can provide an ideal medium for bacteria to colonise and multiply, resulting in an increase in the risk of a wound infection (Miller and Glover, 1999; Pudner and Ramsden, 2000; Gottrup et al, 2005). The

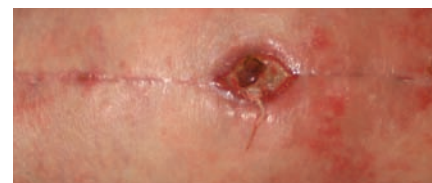


Figure 3. Haematoma development.

development of postoperative haematomas can result in wound dehiscence as the haematoma requires an exit in which to drain and the newly formed suture line is the most vulnerable area. The size and significance of the haematoma will guide the practitioner to a management plan. Reabsorption is usually possible for small haematomas, sometimes aided by ultrasound to break it down or by insertion of a wound drain to clear it. Larger haematomas will often cause a significant dehiscence and may need surgical evacuation. The use of leeches to assist in evacuation of the haematoma is also a commonly used procedure within plastic surgery when the surgery has involved flap reconstruction (Godfrey, 1997).

Nutrition

Wound healing is heavily influenced by the nutritional status of the patient and its importance should not be underestimated (see pp. 8–13 and 92–95 of this publication). This is especially important in those patients at highest risk of a poor diet such as those with poorer socioeconomic backgrounds (Miller and Glover, 1999; Pudner and Ramsden, 2000). A well-balanced diet is essential to maintain healthy skin and facilitate wound healing. An adequate intake of proteins is needed to produce collagen during the proliferative phase of healing; fats are required to ensure normal cell formation and



Figure 4. A dehisced surgical wound due to poor nutrition and anaemia. Note that the granulation tissue is pale and flat which gives clues to the cause of dehiscence being nutrition and/or anaemia.

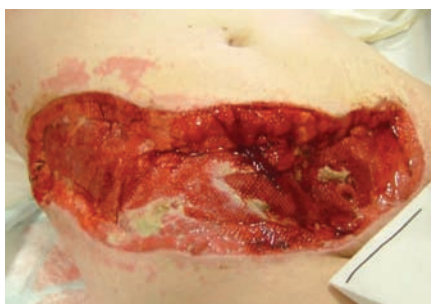


Figure 5. Laparoscopic sterilisation with subsequent dehiscence and debridement caused by infection and excessive wound drainage due to a bladder fistula.



Figure 6. Above-knee amputation dehisced due to a restricted blood supply and excessive wound exudate.



Figure 7. Below-knee amputation dehisced due to a restricted blood supply. Note the dark, discoloured unhealthy appearance of the granulation tissue.

carbohydrates provide the energy required during cell division and cell replication (Wysocki, 1992). Essential vitamins and minerals such as zinc, iron and vitamin C are also vital to the wound healing process and its success.

The intake of vitamin C in the patient's diet is essential for collagen formation. A lack of collagen will delay wound healing and increase the risk of wound dehiscence due to lack of strength within the wound (Gray and Cooper, 2001). Granulation tissue should be a vibrant red colour with a lumpy velvet and shiny appearance. If it appears dull, discoloured, flat and pale it is a sign that the wound is not healing as it should (Figure 4).

Exudate/oedema

Fluid from an acute wound plays an essential role in the wound healing process and without it the wound would fail to progress through the stages of wound healing which are haemostasis, inflammation, proliferation and maturation (Bale et al, 2000). However, an excessive amount of fluid loss, exudate or oedema surrounding the wound can have a detrimental effect on wound healing (Cameron, 2004; Scanlon, 2004) (Figure 5). Excessive exudate loss can be attributed to wound infection/critical colonisation, fistula formation, nutritional deficits causing hyperalbuminaemia, cardiac/renal failure and poorly controlled venous hypertension/lymphoedema.

Vascular supply

A deficient vascular supply to a wound can be caused by a chronic or acute medical

condition such as peripheral vascular disease, oedema, anaemia or smoking. Wounds need a good quality and adequate blood supply to facilitate the delivery of oxygen and essential nutrients to the wound bed (Miller and Glover, 1999) (Figures 6 and 7). Some anatomical locations already have a poor blood supply such as ear cartilage (Bale et al, 2000), and scar tissue is also relatively avascular following the maturation phase of wound healing.

Conditions such as anaemia will reduce the delivery of oxygen to the wound bed, which is also true of smoking.

Mechanical stress

Mechanical stress causing wound dehiscence (Figures 8 and 9) at the wound site can be due to a number of reasons such as suturing being inappropriately tight, obesity, oedema, frequent movement of the affected area and unrelieved pressure.

Obesity in the UK is becoming a significant public health problem (James et al, 2001). It has been associated with higher wound infection rates and places significant mechanical stress on the wound in the postoperative period, reducing the patient's ability to heal (Vuolo, 2006). Obesity can have detrimental effects on wound healing and can lead to a delay in healing, a reduced tensile strength in the wounded tissue or wound dehiscence (Figures 8 and 9).

Conclusion

The postoperative management of a surgical wound can be straightforward. The general



Figure 8. Abdominal wound dehiscenced due to mechanical stress likely to be caused by obesity.



Figure 9. Abdominal wound with mesh visible, dehiscenced due to the presence of excessive oedema.

principles of care are to keep the wound clean and dry, assess for any complications and remove sutures or staples when the wound is healed. If complications arise, practitioners should be able to assess and identify the causative factors as a priority so that they can be managed effectively and wound healing can be achieved. **WE**

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