

Management of surgical wounds

Nursing Times VOL 99, NO 13, 01 April 2003

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Most surgical wounds are categorized as acute wounds, healing without complication in an expected time frame (Bale and Jones, 1997). However, like all wounds, healing is affected by intrinsic and extrinsic factors that may result in complications.

All wounds follow a specific cellular and biochemical sequence of healing. Immediately after wounding occurs, mast cells degranulate and release inflammatory mediators, which allow local blood vessels to dilate. Neutrophils enter the wounded area to digest bacteria, followed by macrophages, which flood the wound bed and release growth factors and prostaglandins to influence the healing process (Nathan, 1987). This inflammatory phase is often characterised by redness and swelling around the wound, accompanied by heat and pain (Tortora and Grabowski, 1996). In clean surgical wounds, this stage can last for three to seven days.

In the reconstructive, or proliferation, stage the growth of new vessels and tissue takes place. Fibroblasts move into the wound and collagen synthesis occurs alongside new vessel growth to fill the wound with granulation tissue (Eckersley and Dudley, 1988). As the defect fills, the wound contracts and epithelial tissue forms at the edges. This stage ends when the wound is fully closed.

In the final stage of healing - maturation - the wound regains its tensile strength and, as the collagen fibres reorganise, the scar loses some of its red pigmentation and lies flatter to the surface of the skin. This phase can take up to 18 months to complete (Clark, 1988).

Preoperative skin preparation

This has been the subject of some debate, particularly with regards to its potential impact on postoperative wound infection.

Shaving: In some instances shaving is necessary to gain access to the surgical site and prevent hair becoming entangled in the suture line. Shaving became a routine part of preoperative care and remained unchallenged until the 1970s when it was suggested that it may be associated with postoperative wound

infection by causing superficial damage to the skin and allowing bacterial colonisation (Seropian and Reynolds, 1971). However, there is no definitive research on the subject.

Preoperative bathing or showering: In the past, patients were encouraged to wash with antiseptic solutions prior to surgery. However, Byrne et al (1990) suggested that at least three showers with chlorhexidine would be required to effectively reduce the skin's bacterial count, though they failed to produce statistically significant results on the incidence of wound infection.

Showering is generally preferable to bathing as it is less likely to result in the transfer of organisms from highly colonised sites, such as the perineum, to less colonised sites (Briggs, 1997). Equally, there is less chance of transfer of organisms from patient to patient if baths are not cleaned adequately between patients.

Other lesions which harbour bacteria, such as pressure ulcers, increase the risk of postoperative wound infection, and if possible, surgery should be delayed until these have healed. Orthopaedic surgery can be catastrophic if the patient develops deep wound or bone infection, and is rarely undertaken if there is any infection elsewhere.

Where surgery cannot be avoided, covering existing lesions with a hydrocolloid at least one day before surgery and leaving it until 24-48 hours after may offer the best protection since it is totally occlusive. There is no research evidence to support this, but in the author's experience it is used in some areas to reduce bacterial spread during the immediate perioperative period.

Postoperative wounds - aims of treatment

While most surgical wounds undergo primary closure, some, such as pilonidal sinus excision, are left to heal by secondary intention. A few, such as abscesses, may be drained and either left to heal by secondary intention or undergo delayed primary closure once the infection has cleared.

Whichever method of healing is chosen, the aims of treatment are to disturb the wound as little as possible to allow healing and prevent bacterial invasion. Patient factors such as comfort, maintaining function and being given adequate information are also a priority.

Surgical incision sites that are healing by primary intention should be clean (Ballard and Baxter, 2000). The skin edges are re-apposed, allowing a clot to form on the incision site providing a barrier against bacterial invasion. The tissue edges of the wound knit together 48 hours after surgery but have little tensile

strength and require continued support from sutures, staples or clips until full epithelialisation takes place.

Wounds healing by secondary intention require dressings which are suited to the size, depth, position and level of exudates. The wound itself should be clean after surgery, although this depends on the nature of, and reason for, surgical intervention.

Dressings for surgical wounds

The primary function of a wound dressing is to promote healing by providing a moist environment and protecting the wound from potentially harmful agents or injury (Turner, 1985). In closed surgical wounds the main function of the dressing is to absorb blood or haemoserous fluid in the immediate postoperative phase. There are many types of dressing available for surgical wounds, and the choice is often based on cost and personal preference.

The most commonly used dressings are simple, low-adherent island dressings, but care should be taken as some adhesives can cause reactions in patients with sensitive skin. Blistering may occur if dressings are applied under tension or over a joint where movement will cause friction between skin and dressing (Gupta et al, 2002). The choice of dressing should also be based on the patient's needs. If, for example, the patient is treated as a day case, a showerproof dressing may be most appropriate if it is required for more than 24 hours.

How frequently, or for how long, a surgical wound should be dressed is also a matter of personal preference. Some units leave wounds exposed from the moment of closure, others uncover them after 24 hours, and others keep them dressed until complete healing has taken place and sutures/clips/staples are removed.

There is no evidence to support a particular regimen for incision sites. When dressings are applied in theatre, it is recommended that they are not disturbed unless they become stained by discharge, clinical signs of infection are present or the patient shows signs of systemic infection (Bale and Jones, 1997). Chrintz et al (1989) suggest that it is not necessary to dress a closed surgical wound at all after 48 hours. Some patients, however, may prefer to have their wound dressed.

Open surgical wounds healing by secondary intention should be dressed appropriately according to size, depth and position. Unfortunately many surgeons opt for gauze-based dressings in theatre, which cause excessive pain on removal (Hollinworth and Collier, 2000) and can become completely adhered to and become part of the healing tissue. A study using a hydrofibre dressing as

opposed to traditional gauze dressings in excisional surgery showed a reduced length of stay, decreased pain, improved patient confidence and enhanced healing rates as well as being easier to apply and remove (Foster and Moore, 1997).

Surgical wound complications

There are two main potential complications in surgical wounds - dehiscence and infection. Dehiscence can range from splitting open of the skin layers to complete dehiscence of the muscle and fascia, exposing internal organs. Occasionally, the skin layers remain intact, but deeper layers break down resulting in an incisional hernia.

Many factors are associated with surgical dehiscence. Age, malnutrition, being male and long-term steroid use are thought to influence the incidence of abdominal dehiscence (Poole, 1985), while smoking, diabetes and rheumatoid arthritis can impair healing by affecting the microcirculation. While malnutrition affects healing, obesity can influence wound breakdown due to reduced tissue oxygenation, increased subcutaneous dead space rendering the patient more susceptible to haematoma and seroma formation and increased incidence of infection (Armstrong, 1998).

Tight suturing can tear the skin and affect vascularity of the wound edges, and may result in necrosis and wound breakdown (Westaby, 1985). Underuse of electrocoagulation in surgery can result in excessive bleeding and haematoma formation. The resulting dead space from a haematoma can weaken the suture line and act as a focus for infection. In most cases, blood is absorbed within a few days or one or two sutures are removed to allow drainage. In severe cases, the suture line must be reopened and the haematoma evacuated surgically. Once clean, the wound can be resutured or allowed to heal by secondary intention.

Wound infection is characterised by redness, pain, heat and swelling of the wound and periwound area. These signs are also seen in the normal inflammatory response, but usually decrease after the first few days. Persistent inflammation or the presence of pus or purulent discharge may indicate infection. Factors affecting the incidence of wound infection are similar to those affecting dehiscence, although drains and sutures act as foreign bodies and increase the risk of infection (Gilchrist, 1999).

Prevention of infection is aided by timely removal of sutures, staples or clips. Where infection is identified or suspected, appropriate management with systemic antibiotics and removal of drains, sutures and staples local to the site of infection is advocated. Infection often leads to dehiscence of the incision site.

Where a wound shows obvious signs of breakdown, it is often pointless attempting to keep it together. Removing sutures and staples will allow better assessment of the wound and enable it to heal by secondary intention or delayed primary intention.

Conclusion

Although research evidence is lacking on preoperative preparation and postoperative care of wounds, patients should be educated about the healing process and early signs of complications.