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Peter Davis reviews the literature on the orthopaedic nursing management of skeletal pin sites with a focus on reducing infection. He highlights the lack of empirical evidence available to guide best practice and provides details of recent clinical guidelines for the management of pin sites

KEY WORDS

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Skeletal pin traction: guidelines on postoperative care and support

Orthopaedic pins and wires have been used to apply skeletal traction for many years, and there has been an increase in the use of external fixators (Santy, 2000; Sims and Saleh, 2000). Multiple pins are frequently used and, as such, create potential portals for infection. Infection rates for these pins are reported to be as high as 85 per cent (Sims and Saleh, 2000). However, pin-site management practices are diverse, contradictory and lack consistency.

The presence of infection can have devastating consequences. These range from loss of fracture alignment and apparatus failure to localised infections that can lead to osteomyelitis. Osteomyelitis is difficult to treat, results in the failure of orthopaedic treatment and surgery, and may lead to long-term pain, discomfort and disability. This condition must be avoided at all costs, particularly in view of the increase in antibiotic resistant micro-organisms. There is, therefore, an urgent need to identify effective nursing interventions that limit these risks.

Review of the literature Many authors have reviewed the orthopaedic literature in order to advise on protocols or guidelines for the care and management of pin sites, with a view to minimising the risks of infection (Lee-Smith et al, 2001). However, few of the reviews are based on reliable primary research and there appears to be an absence of large, multicentre, controlled clinical trials in this area.

Clearly, in the absence of clinical evidence, there is a need to provide orthopaedic nurses both nationally and internationally with clinical guidelines on which to base best practice.

Consensus guidelines In the absence of reliable empirical research, summary guidelines (Table 1) were produced by a working group of the RCN Society of Orthopaedic Nursing (Lee-Smith et al, 2001). These should be used by nurses in conjunction with local guidelines for wound care and infection control.

The use of guidelines should also be discussed with appropriate members of the health care team. An interdisciplinary approach is essential to their implementation. Approval by relevant local groups, such as risk-management and quality committees, is also advised. Guidelines are important in promoting evidence-based practice. They synthesise evidence into clear practice recommendations, helping to minimise the decision-making difficulties practitioners face in the clinical environment.



Fig 1. The areas around skeletal traction pins are potential sites for colonisation with micro-organisms

The guidelines should be viewed as advisory and not mandatory, as they are not intended to replace clinical decision-making (Davis et al, 2001). Guidelines help nurses to deal with the complex situations they are increasingly encountering, where the correct course of action is often far from obvious. Any guidelines should be critically scrutinised to determine their value and reliability. The quality of evidence used in formulating guidelines is of profound importance (Davis et al, 2001).

Management of pin sites Care of pin sites can be split into a number of areas:

Immediate postoperative care Immediate postoperative dressings should be absorbent, easy to remove or non-stick, conformable, relatively cheap and available in both the hospital and the community. The dressing should not require tape to secure it.

Although many nurses remove postoperative dressings 48 hours after surgery there seems to be no reason for this. Hence, for reasons of patient comfort and early assessment of potential problems, it is recommended that the pin-site entrance and exit wounds be inspected within the first 24 hours. Similarly, all pin sites should be re-dressed after 24 hours, as there is likely to be exudate in the initial postoperative period.

There is no reliable evidence to support the use of any of the cleansing solutions used to clean/dress pin sites. It is therefore recommended that no solution be routinely used in the immediate postoperative period. If necessary, normal sterile saline or water can be used to remove exudate or dried blood from the area around the pins.

Once the pin sites have been inspected, a dressing that applies a small amount of pressure to prevent tenting of the skin along the pin should be applied. The dressing should be kept in place and removed

TABLE 1. POSTOPERATIVE MANAGEMENT OF PIN SITES: A SUMMARY OF GUIDELINES

GUIDELINE	RATIONALE
■ Apply absorbent low-adherent, sterile dressings immediately postsurgery	■ To absorb blood and exudate
■ Inspect the wound within 24 hours of surgery	■ For patient comfort and early assessment of potential problems
■ Re-dress all pin sites after 24 hours	■ There is likely to be exudate and bleeding
■ No solution should be used on the immediate postoperative dressing	■ There is no reliable evidence to support any of the solutions currently used to clean/dress pin sites
■ Use only sterile normal saline or water to clean exudate or dried blood away from the area around the pins	■ There is no reliable evidence to support any of the solutions currently used to clean/dress pin sites
■ Use a dressing that applies a small amount of pressure and keep it continuously in place	■ To prevent tenting of the skin along the pin (Sims and Saleh, 1996)
■ Remove dressings only as required. Aseptic technique must be rigorously maintained at all times during pin-site care and observation	■ To prevent cross-infection
■ Observe the pin-site dressings regularly, at least daily in the immediate postoperative period. Observe for increased tenderness or pain at the pin site, increased level of exudate, presence of pus, an odour from the site and any increased inflammatory process	■ To identify problems at an early stage
■ Take seriously any complaints from the patient	■ Patients are often the first to identify any problems
■ Clean pin sites daily with non-shedding material (such as gauze) using only normal saline or sterile water to remove exudate or dried blood. Otherwise, do not clean	■ There is no evidence to support the use of any other solutions, as any alternatives may cause damage
■ Leave the wound dry after cleaning	■ Moisture encourages colonisation by micro-organisms
■ Meet general hygiene needs by showering	■ There seems little support for sterile cleansing after this effective washing. Bathing is to be discouraged
■ Gently remove scabs and crusts around the pin sites. Clean or dry rub with gauze. Do not massage	■ Enables the wound to be observed and encourages free drainage of exudate, which may harbour infection
■ Keep metal work socially clean	■ To remove social contamination and wound exudate
■ Teach the patient to shower at home and dry the fixator with a clean towel used for this purpose only. Actively clean pin sites only if exudate is present	■ Tampering with the pin sites excessively can lead to infection
■ Educate the patient, the family and community staff to look for signs of pin infection	■ To identify problems early
■ Provide as much written and verbal information to patients and carers as possible	■ To reduce anxiety, increase compliance and provide support
■ Provide opportunities to contact other patients and support groups	■ To provide psychological support and information
■ Keep patient care regimes simple and provide instruction and evaluation. Expect non or poor compliance	■ To increase compliance
■ Provide psychosocial support	■ The presence of percutaneous pins can have a major negative impact on a patient's self-image

Source: Lee-Smith et al (2001), with permission from Elsevier Science

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infrequently when required to inspect the wound, for example, if there is increased pain or exudate. An aseptic technique must be rigorously maintained at all times during pin-site care and observation.

Increased tenderness or pain at the pin site should always alert the carer to potential problems; as should an increased level of exudate, presence of pus, an odour from the site or increased inflammation. This should be coupled with general observations for infection, such as low-grade pyrexia, increased pulse and respiratory rate. The presence of other pathology or infections in other parts of the body, for example, urinary tract infection, should be of concern, as will a raised erythrocyte sedimentation rate, which may indicate the presence of chronic infection.

Subsequent care of the entrance and exit wound site

A range of solutions is available to cleanse the exit and entrance wound around the pin but those used in hospital are typically alcohol based or simple saline. Application of any cleaning fluid must be done with a non-shredding material, such as gauze.

It is vital that the wound is left dry after cleaning: alcohol evaporates after application but is toxic to healthy tissue. It is recommended that sterile saline be used to remove exudate or dried blood, if a cleaning agent is required. The wound itself should not be moistened.

While in hospital the patient should shower, rather than bath, and there seems little support for the practice of sterile cleansing of the pin sites after a shower. In addition, many patients attend hydrotherapy with fixators in place and do not seem predisposed to infections.

Gentle removal of the scabs is encouraged: this will make the wound visible and encourage free drainage of exudate, which may harbour infection if allowed to collect below the skin. This is considered useful with mono-frames and larger screws rather than fine wires, particularly when the fixator is applied to areas such as the pelvis.

Cleaning the pins and guidelines for daily living

Cleaning the metal work of the fixator both to remove social contamination and wound exudate is important. At home patients are taught to have a shower regularly and to dry around the pins and fixator frame with a clean towel used for this purpose only, which is washed after each use. If exudate remains after the shower, this can be removed using sterile saline or boiled water at home. Pins are cleaned by wiping in the direction away from the exit wound.

Alcohol and iodine-based products should be avoided as they will accelerate corrosion of the metal of the fixator and cause skin staining.

Definitions of infection and management One of the most difficult aspects of pin-site care is recognising the differences between the normal healing process and the development of an infection. Definitions developed from the consensus conference (Lee-Smith et al, 2001) are listed below:

■ **Reaction** This describes the normal changes that occur at the pin-skin interface in the initial 72-hour period following insertion of the pin. Typically, these include a change in colour from the patient's normal skin tone, an increase in local heat and loss of serous fluid or blood. These changes are expected to subside.

■ **Colonisation** Colonisation is indicated by a persistent change in skin colour (redness), increased warmth, increasing exudate or associated pain at one or more pin sites. Microbiological swabs will show a growth of local flora of between 10^3 and 10^4 organisms/cm².

■ **Infection** Infection is the presence of the symptoms described above, with a swab culture showing a growth of flora of between 10^5 and 10^7 organisms/cm². There may also be visible drainage of pus and the pin may be loose. However, the presence of infection deeper in the tissues may not be apparent on the skin surface, so any patient with systemic symptoms of infection should be investigated.

Patient, carer and parental support, information and teaching

For many patients the external fixation equipment is applied as a result of trauma, so there is no time to give preoperative information. For others, including children, considerable time should be spent helping them and their families to understand what has and will happen.

Fixators appear grotesque and painful and this can have a considerable impact on self-image. Information needs to be available in written, oral and more visual formats, and needs to be consistent. Patients can be given information about specialist support groups, such as the Ilizarov-wearers' support group at www.ilizarov.org.uk. Meeting other patients may also be helpful, as is an increase in general public awareness.

Patient involvement Patients may have different perspectives on health care processes, priorities and outcomes from health professionals. The involvement of patients or patient representatives in the development of guidelines is important to ensure that they reflect patients' needs and concerns. Patients also have an important role in promoting guideline implementation, and it is essential that they should have access to information on the recommendations of published guidelines (Haines, 2000). ■