

The use of Mepilex on dehisced amputation wounds

Lower limb amputation wounds are difficult to dress because of their shape and location. This is compounded in Central Manchester because of the overall aim to promote transtibial as opposed to transfemoral prosthetic rehabilitation. The reduction in revision surgery results in larger dehisced amputation wounds and an increased amount of exudate generated by the compressive action of early mobility aids during rehabilitation. In this situation, dressings need to be conformable, compressible, comfortable and able to handle large amounts of exudate. Mepilex is one such dressing which can be used to promote healing without delaying rehabilitation.

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KEY WORDS

Transtibial amputation
Prosthetic rehabilitation
Mepilex
Wound healing

A large proportion (85–90%) of amputations performed in the developed world occur as a result of ischaemia or infection arising from peripheral vascular disease, diabetes or renal failure (Donohue and Sutton-Woods, 2001). These are mainly of the lower limbs; namely digital, transmetatarsal (forefoot), transtibial (below the knee) and transfemoral (above the knee) amputations.

Less commonly, serious accidents can lead to the loss of a limb, as can the development of a local tumour or cancer. These amputations (9–13%), tend to occur in younger patients whose wounds heal well and therefore this patient group tend not to require complex wound dressings (Ham and Cotton, 1991).

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However, wound healing complications such as infection, oedema and tissue necrosis following major lower limb amputation are common due to the coexistence of multiple pathologies such as peripheral vascular

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disease, diabetes and renal failure (Harker, 2006). The frequency of these complications is further increased in older patients and those who smoke due to increased skin fragility with age and reduced tissue oxygenation as a result of the systemic effects of cigarette smoke, respectively (Harding, 1993; Vowden and Vowden, 1996).

Such complications of amputation wound healing can lead to complete wound dehiscence with exposure of the underlying bone and have been shown to affect the ability of the amputee patient to rehabilitate on a prosthesis (Rommers et al, 2000).

Prosthetic rehabilitation

Following lower-limb amputation, unhealed transtibial stump wounds are traditionally treated conservatively with a combination of dressings, non-weight bearing exercises and bed rest until healed or a clinical judgement is made that the wound is unlikely to heal and thus requires surgical revision to transfemoral level. Historically, more transfemoral amputations were performed compared to transtibial, due to the perceived increased healing rate of the transfemoral wound post-surgery (Murdoch, 1977; Moore et al, 1989). However, transtibial amputees are known to rehabilitate more successfully, especially in the elderly (Mueller and Delitto, 1985; Steinberg et al, 1985; Pohjohlainen et al, 1990; Houghton et al, 1992; McWhinnie et al, 1994).

Conservation of the knee joint results in retained proprioception and a lower energy requirement in terms of mobilisation than higher levels of amputation and is therefore desirable for both the patient and for the rehabilitation team (Moore et al, 1972; Fleurant and Alexander, 1980; Moore et al, 1989; Van Niekirk et al, 2001). In support of this, Acton et al (1984) suggested that the energy requirement to successfully use a transfemoral prosthesis exceeds the capacity of most elderly patients with peripheral vascular disease.

Rehabilitation in Manchester

In 1999 Van Ross et al (2001) recruited, across two hospital sites in Manchester, patients with large open wounds to a trial involving compression and early walking on a pneumatic post amputation mobility (PPAM) aid and subsequently a primary prosthesis. They concluded that this method of treatment increased mean tissue oxygenation (tcPO₂) from 39.3mmHg to 50.3mmHg and achieved 95% healing with mobilisation. This supports Moore et al (1972) who recognised that the compression achieved by early walking on an immediate post-operative prosthesis (IPOP) enhanced wound healing by reducing oedema and improving blood flow in the stump because of the influence on the collateral circulation.

Following the results of the Van Ross et al (2001) trial, the principles of compression and early mobilisation of large dehisced transtibial amputation wounds were adopted as standard protocol in the two study hospitals in Manchester:

Clinical challenge

The complex nature of amputation wounds in terms of shape, size and location coupled with the functional demands of rehabilitation such as walking on a prosthesis, dictates that a dressing used in these circumstances needs to meet certain criteria. These include:

- ▶▶ Conformability to allow moulding around a stump
- ▶▶ Ability to handle a moderate to high level of exudate without maceration to the peri-wound skin
- ▶▶ Compressibility under shrinker socks, early walking aids and prostheses
- ▶▶ Comfortable for the patient to wear and atraumatic to the wound and surrounding skin on removal.

Mepilex

Recently a new category of dressing has been introduced which claims to overcome the twin problems of adherence to the wound and damage to the surrounding skin. It relies upon an adhesive technology (Safetac®) which uses soft silicone. This material



Figure 1. Left transtibial amputation on first assessment.

adheres readily to intact dry skin but does not stick to the surface of a moist wound and does not cause damage upon removal (White, 2005). These properties have been demonstrated in the laboratory (Dykes et al 2001; Dykes and Heggie, 2003).

Mepilex (Molnlycke Healthcare, Dunstable) is an absorbent dressing made from polyurethane foam, the outer surface of which is bonded to a vapour-permeable polyurethane membrane that acts as a barrier to liquid and microorganisms. This membrane, which has a wrinkled appearance, is applied in this way to accommodate the slight swelling that occurs as the dressing absorbs exudate. The inner surface of the foam is coated with a layer of soft silicone that helps to hold the dressing in place without sticking to the surface of the wound or causing trauma to delicate new tissue on removal.

Three case studies will now be presented that demonstrate the use of Mepilex in patients with amputation wounds.

Case report 1

Mrs B is a 56-year-old female who has diabetes controlled with insulin and chronic renal failure requiring daily peritoneal dialysis. She underwent bilateral transtibial amputations for



Figure 2. Left transtibial amputation at week 8.



Figure 3. Left transtibial amputation with dressings and shrinker socks applied.

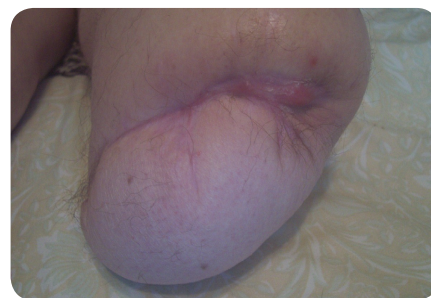


Figure 4. Left transtibial amputation at week 22.

non-healing foot ulcers and ischaemic toes. She was referred to the vascular outreach specialist practitioner following the removal of sutures to both wounds on day 14 post-amputation. On initial assessment the wounds had completely dehisced, were sloughy, oedematous, and heavily exudating, with the distal ends of both tibia exposed. The wounds were also extremely painful, particularly during dressing changes (Figure 1).

A hydrofibre dressing impregnated with silver was selected as a primary dressing as both wounds were found to be colonised with methycillin-resistant *Staphylococcus aureus* (MRSA). Mepilex was used as a secondary dressing.

Initially, because of the size of the wounds it was necessary to position three Mepilex foam dressings (10x20cm) anteriorly to posteriorly secured with stockinette on each amputation site to provide optimum exudate management. At this stage, in view of the copious amounts of exudate, and also in order to allow sharp debridement of necrotic tissue and slough, the dressings were changed daily. At 5 weeks, exudate levels had reduced and granulation tissue was evident in both wounds. Application of compression therapy had helped to reduce oedema and both areas were less painful to the patient.

Despite the still moderate levels of exudate, the peri-wound skin remained healthy with no signs of maceration. By week 8, both wounds were considerably smaller and all slough and necrotic tissue had been removed. Granulation tissue was evident over the distal ends of both tibia and there was epithelialisation at the wound edge (Figure 2). At this stage, only one Mepilex dressing, applied horizontally across each wound, was required. The compressibility of Mepilex allowed the application of shrinker socks, without reducing its effectiveness in terms of its ability to handle exudate (Figure 3). The wounds continued to improve and by week 22 had almost completely healed, with the exception of the areas of exposed tibia (Figure 4). Mrs B is expected to undergo revision surgery to refashion these areas at some point in the near future.



Figure 5. On removal of sutures, the wound was exudating and macerated.

Case report 2

Mr D, a 64-year-old man with peripheral vascular disease caused by heavy smoking, underwent a transtibial amputation to his right leg using the sagittal surgical technique (Robinson, 1991). On removal of the sutures 14 days after the operation, the distal end of the suture line dehisced. The resultant wound was sloughy and producing large amounts of exudate after mobilising on the early walking aid in physiotherapy. This was resulting in excoriation of the surrounding skin (Figure 5).

AQUACEL® Ag (ConvaTec, Ickenham), was applied to the wound, with Mepilex selected as the secondary dressing, because of its ability to handle exudate, and its conformability under compression from early walking aids (Figure 6). Dressings were changed every 2–3 days as required. One week later, the peri-wound skin was intact with no maceration, the wound had reduced in size and healthy granulation tissue was present (Figure 7). The use of Mepilex enabled Mr D to be fitted with a primary prosthesis and continue rehabilitation despite having an open, exudating wound (Figure 8).

Case study 3

Mr B is a 58-year-old man who had a left transtibial amputation for distal



Figure 6. Mepilex applied to wound area.

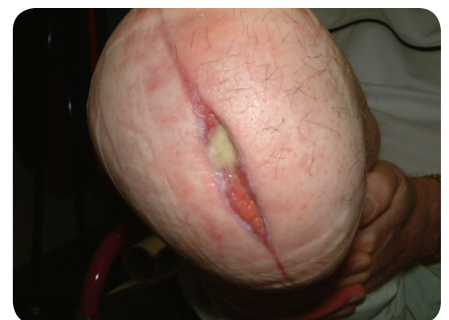


Figure 7. The wound area has reduced, with no maceration of the surrounding skin.



Figure 8. Application of prosthesis.



Figure 9. Dehiscent wound with necrosis extending across the suture line.



Figure 10. Slough being debrided.



Figure 11. Fully healed wound.



Figure 13. Clean and granulating wound.



Figure 12. Large, dehiscent and sloughy wound following right transtibial amputation.



Figure 14. Fully healed wound.

popliteal vessel disease and occlusion. Following removal of the sutures, there was an area of necrosis extending across the suture line. The central area was sloughy and exudating and the wound was very painful, especially at dressing changes (Figure 9). A hydroactive, hydrogel-coated dressing with 20% medical grade honey on an open weave mesh was used as a primary dressing. This was selected to facilitate autolytic debridement of the wound and also because the wound was colonised with MRSA. Mepilex was selected as a secondary dressing. Dressings were changed on alternate days due to the amount of exudate produced and also to allow sharp debridement of the wound.

By week 4, much of the necrotic tissue had been removed, and although the wound was still exudating, the peri-wound skin remained healthy and Mr B reported a decrease in pain levels especially during dressing changes (Figure 10). By week 6, all necrotic tissue had been removed. The wound was sloughy but granulation tissue was present on the wound bed and as Mr B had been successfully using an early walking aid, he was cast for a primary prosthesis. Mr B was discharged home using a prosthesis at week 8, despite still having a large wound. The dressing regimen was continued in the community and the wound continued to granulate. By week 26 the wound was fully healed (Figure 11).

Shortly afterwards, Mr B was readmitted for an elective transtibial amputation of his remaining right leg, due to a non-healing ulcer to his heel, and ischaemic toes. Following the removal of the sutures 14 days after surgery, the wound dehisced and a large sloughy wound was evident (Figure 12). Again, the wound was exudating and very painful. Due to his previous positive experience and outcome using Mepilex foam dressings, Mr B was keen for this dressing regimen to be used again. As the wound had very similar characteristics to the previous amputation wound and Mepilex foam dressing had successfully met the clinical challenges, it was selected as the secondary dressing. The primary dressing selected was also as before since the wound was again infected with

MRSA, and as the dressing regimen had worked well previously, it reduced patient anxiety and increased confidence in the outcome of wound healing. By week 4 the wound had improved with a decrease in the amount of slough present. Mepilex foam dressing was able to manage the exudate produced under compression from a shrinker sock and from use of an early walking aid in physiotherapy. The wound decreased in size and Mr B was discharged home and continued prosthetic rehabilitation as an outpatient. As a consequence of the bilateral wounds continuing to progress towards healing at transtibial level (Figure 13), revision to transfemoral level was avoided and Mr B was able to mobilize with the aid of bilateral prostheses and walking sticks. As mentioned at the beginning of the article, this outcome would have been extremely difficult if not impossible, considering Mr B's co-morbidities of diabetes and renal failure, if the surgery had been revised to bilateral transfemoral amputations. It is likely he would have been confined to a wheelchair. The use of these dressings has enabled him to improve his functional ability through reducing the delay in rehabilitation which is often a consequence of large wounds. Mepilex foam dressing was used until full healing was achieved at week 28 (Figure 14).

Conclusion

These case studies demonstrate that Mepilex can meet the clinical needs of dehisced wounds following lower limb amputation. The dressing is conformable, compressible and comfortable and is able to manage moderate amounts of exudate without macerating the surrounding skin. This allows rehabilitation to continue despite the presence of large open wounds and therefore promotes optimal functional outcomes for this patient group. **WUK**

Preferences

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Key Points

- ▶ Wound healing complications such as infection, oedema and tissue necrosis following major lower limb amputation are common due to the coexistence of multiple pathologies.
- ▶ Transtibial amputees are known to rehabilitate more successfully than transfemoral, especially in the elderly.
- ▶ Early mobilization of patients following transtibial amputation in Manchester, despite the presence of large dehisced wounds led to the need to find a dressing that could meet the clinical challenges of size, location and increased exudate production under compression.
- ▶ The case studies demonstrated that Mepilex soft silicone 10x20cm dressing met these clinical challenges and enabled prosthetic rehabilitation to continue in the presence of large dehisced amputation wounds.

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