

The use of Silvercel® to dress excision wounds following burns surgery

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Extensive skin necrosis in patients who have been severely burnt exposes them to a high risk of septicaemia with possible severe consequences (Dioguardi et al, 1994; Di Lonardo, 2005). When treating such patients there are two main aims: to remove the necrotic tissue as quickly as possible through surgical excision and then to protect the excised areas until enough autologous skin is available to perform reconstruction.

One way of protecting the excised sites is by taking allogeneic skin from a living or dead donor. The fresh or cryofrozen skin can temporarily take root on escharectomised areas before being unavoidably rejected. However, by removing the epidermal layer of the allograft, it is possible to avoid dermal layer rejection. It will therefore stay on the wound bed, creating a substratum that autologous keratinocytes harvested *in vitro* can take root in (Cuono's technique) (Cuono et al, 1986).

If there is no allogeneic skin available, however, an alternative covering is required that is temporarily capable of carrying out the skin's main functions. Such a dressing should have:

- ▶▶ Good mechanical resistance that allows it to remain in place for long periods without having to be frequently changed. There are clinical and economical advantages when the number of dressing changes are reduced. The patient experiences less stress, bleeding in the damaged area is reduced, materials are saved and there is a reduced involvement of medical staff
- ▶▶ The ability to conform closely to the wound bed providing an effective barrier against micro-organism infection
- ▶▶ The ability to absorb and retain the abundant exudates usually produced by such wounds, providing a moist wound healing environment that favours wound closure
- ▶▶ Efficient antiseptic properties against pathogens commonly responsible for infections
- ▶▶ Haemostatic action that is able to limit the degree of haemorrhage in the excised areas.

Silvercel

Silvercel® (Johnson & Johnson Wound Management, Ascot) is indicated for use in the management of all moderate to heavily exuding partial and full-thickness chronic wounds. The dressing consists of a sterile, non-woven pad composed of hydroalginate and silver-coated fibres. Silvercel conforms well to the wound bed and quickly forms a resistant barrier against bacteria.

Hydroalginate is a highly-absorbent material that maintains an optimal moist wound healing environment in exuding wounds. Its unique composition is a mixture of high G calcium alginate and carboxymethylcellulose. The hydroalginate material increases its tensile strength when in contact with wound exudate, facilitating easy dressing removal from exuding wounds.

Carboxymethylcellulose is very absorbent which makes it appropriate for treating patients with severe burns who have undergone surgical excision of eschar tissue, because they produce abundant exudate (Vloemans et al, 2001). Calcium alginate increases the absorbency of the dressing and exerts a haemostatic action at the same time. Finally, the presence of silver results in a local antimicrobial action for 5–7

days without remarkable histotoxic effects (Dioguardi et al, 2004).

With all these characteristics, Silvercel is a useful alternative to the allogeneic skin used during surgical repair of severely burnt skin. In the following case, the clinical effectiveness of Silvercel was compared with Aquacel® Ag (ConvaTec, Ickenham). Aquacel Ag is composed of sodium carboxymethylcellulose and 1.2% ionic silver, and is frequently used to dress wounds arising from the surgical excision of eschar tissue.

Materials and methods

A 28-day evaluation was carried out in June 2005 in the Division of Burns Surgery, Azienda Policlinico, in Bari. The patient was a 13-year-old male who had deep burns over more than 50% of his body following an explosion. Early surgical excision of eschar tissue was carried out on the upper limbs after five days of hospitalisation. Accurate haemostasis was reached through diathermocoagulation and the administration of saline solutions and adrenaline packs with a concentration of 15mg/l. No allogeneic skin or other biological dressings were available to protect the excision sites. As an alternative, modern aseptic dressings in non-textile fibre were considered because of their absorptive properties and for their ability to exert an extended and efficient aseptic and non-histotoxic action.

Both wounds measured approximately 800 cm². The wound on the left arm was covered with four 10cmx20cm Silvercel dressings and the wound on the right arm was covered with two 20x30cm Aquacel Ag dressings (Figures 1 and 2).

A secondary dressing was made on both arms using sterilised cotton pads with a layer of cotton wool and

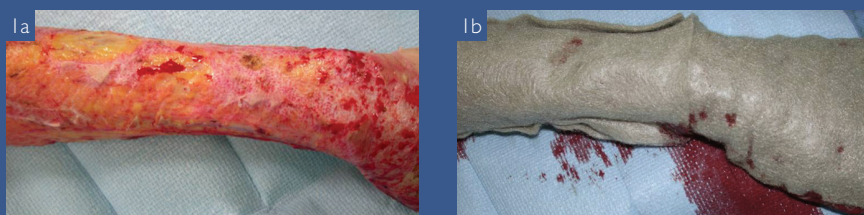


Figure 1. a Left Arm after an escharectomy (above) and, b. temporarily covered with Silvercel.



Figure 2. a. Right arm after escharectomy and, b. temporarily covered with Aquacel Ag.

an elastic three-layer compression bandage. Post-operative check-ups were performed every 48 hours to assess the status of the dressings and to look for clinical evidence of infection. Microbiological samples were taken from the wound exudates on the surface of the primary dressing using superficial pads every four days for 28 days. A final evaluation was performed analysing the following clinical parameters:

- ▶▶ Period of permanence
- ▶▶ Ability to absorb exudates
- ▶▶ Incidence of septic complications.

Results

Period of permanence

For almost three weeks, both Silvercel and Aquacel Ag conformed well to the wounds on both arms. Both primary dressings showed no structural alterations to necessitate immediate substitution. Indeed, only one application post-debridement was needed for both Silvercel and Aquacel Ag. Abundant irrigation with saline solution made the removal of the dressings very easy (Figures 3,4,5 and 6).

Ability to absorb exudates

Both primary dressings were able to absorb and retain fluids, despite the hyperproduction of blood serum, with no maceration of surrounding healthy skin or structural deterioration occurring. Post-operative check-ups on the excised areas were quick and easy and secondary dressings were easily

removed from the primary dressing, avoiding pain or contingent bleeding (Figures 3,4,5 and 6).

Incidence of septic complications

Both dressings conformed closely to the wound bed, providing protection from infection. Every four days for 28 days, superficial pads applied to both arms showed colonisation with only *Pseudomonas aeruginosa* that was detected on day 8 post-surgery in both wounds. There was no clinical evidence of local infection on either of the arms during the whole period of the evaluation. Before surgical reconstruction, when the dressings were removed, the wound beds appeared to be well cleaned with a good amount of granulation tissue present. Both were well vascularised, confirming that there were no infective complications (Figures 5 and 6) and it was possible to perform a skin self-transplant on both excision sites that rooted completely.

Both Silvercel and Aquacel Ag were applied directly after surgical excision following accurate haemostasis through diathermocoagulation. The Silvercel dressings appeared to be helpful in supporting haemostasis (Figures 6 and 7), judging by the low amount of blood soaked by the dressing at the end of the wear time. This may be as a result of its calcium alginate component, however, this claim warrants further investigation.



Figure 3. Review after two weeks treatment. a. left arm (Silvercel); b. right arm (Aquacel Ag).



Figure 4. a,b. Check-up on the left arm after three weeks of treatment before removing Silvercel.

Discussion and conclusions

Modern antiseptic and absorptive dressings can be extraordinarily effective when temporarily covering escharectomised areas. In a patient with severe burns, these kinds of lesions are difficult to manage, especially if no allogeneic skin is available. A large amount of blood serum is wasted (which has an obvious impact on dyscrasic and metabolic issues) with the resultant risk of dangerous complications and infections. Thus it is necessary to form a perfect barrier between the wound and the outside environment using materials that are able to resist the macerating effect of abundant exudate.

In this study, both primary dressings showed good results. They quickly transformed to produce a solid, compact membrane that sufficiently adhered to the bed of the wounds, thus limiting the loss of metabolites and constituting a valid barrier against bacterial aggression. Managing the wounds during the post-operative period was easy and limited pain for the patient. Both products were able to absorb and retain exudates of excessive blood serum, thus maintaining a moist wound environment conducive to healing. On removal of the dressings, a clean wound bed with granulation tissue could be seen and this, coupled with a lack of infective complications, ensured the patient could successfully receive skin autografts and continue along the road to recovery. **WUK**

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Figure 5. a. Right arm. b. Aquacel Ag removal after three weeks : no clinical evidence of local infection; good vascularisation of the wound bed.



Figure 6. a. Left arm. b. Silvercel removal with no clinical evidence of local infection; good vascularisation of the wound bed.

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Figures 7. Silvercel dressing (a) and Aquacel Ag (b). Less blood can be seen soaked through on the Silvercel dressing, which may be a result of its calcium-alginate component supporting haemostasis.