

Use of a transforming powder dressing in the lower leg wounds of two older patients: case studies

Abstract: This report describes the use of a transforming powder dressing to treat lower leg surgical wounds occurring in two older patients. Wounds in this location are difficult and slow to heal. Both of these wounds exhibited complete granulation within two weeks of

powder application and total healing in under four weeks, all while requiring no patient or nursing wound care.

Declaration of interest: Dr. Smith is a consultant for and serves on the Scientific Advisory Board of Uluru, Inc.

methacrylate • occlusive dressings • surgical wound • wound healing

An ideal wound healing dressing would be effective, inexpensive, painless, non-allergenic, able to conform perfectly to the wound and require no patient care. To date, several categories of wound dressings have arisen which have satisfied one or more of the above criteria, but never all. Here we report the use of a product which appears to satisfy the requirements of an ideal dressing, transforming powder dressing.

Transforming powder dressing is composed of 84.8% poly-2-hydroxyethylmethacrylate (pHEMA), 14.9 % poly-2-hydroxypropylmethacrylate (pHPMA) and 0.3% sodium deoxycholate. Upon contact with wound exudate, the polymer particles aggregate irreversibly into a flexible film dressing, which contours exactly to the underlying wound bed. In some cases, application of sterile saline via mist or droplets is advisable to accelerate the transformation of the powder into a dressing. The aggregation of the polymer particles creates a dressing of high porosity that enables the passage of oxygen to the wound.¹ A moist wound bed is maintained, while excess moisture is drawn through the dressing by evaporation from the dressing surface.² Since the pores are too small for exogenous bacteria to penetrate, the risk of infection is minimised.

Case 1

A 78-year-old man underwent surgical removal of a squamous cell carcinoma of the left medial malleolar region with Burow's graft repair. Standard wound care of bacitracin ointment applied 2–3 times a day was implemented at the time of dressing removal on the second postoperative day. At suture removal two weeks later, the graft was necrotic, as was a small area of the

flap portion of the repair. The necrotic graft was fully debrided with scissors and the patient instructed to continue standard wound care with bacitracin ointment 2–3 times a day.

The patient returned three weeks later. The wound was now 4.0x1.1cm in size with some overlying moist fibrin, which was easily debrided with scissors, revealing a clean bed (Fig 1a). After discussing the strong probability of a lengthy healing course (2–4 months) due to the location of the wound, the patient was given the option of alternative wound treatment with a transforming powder (Altrazeal, Uluru Inc, Addison TX, US), which he chose. Transforming powder was applied to the entire wound and moisturised with normal saline. The wound was covered with a sterile gauze pad, which the patient was instructed to remove the next day. Follow-up was scheduled in one week.

At follow-up (one week later) the wound showed significant granulation of the former graft site. The lateral thirds of the wound (corresponding to areas of flap edge necrosis) were nearly completely granulated, with peripheral re-epithelialisation evident (Fig 1b). Wound dimensions were 3.7x0.9cm. The minimal remaining fibrin was easily debrided and a second application of transforming powder with moisturisation (saline) took place (Fig 1c). Follow-up was scheduled for one week.

At the second follow-up the former graft site was completely granulated, with re-epithelialisation around the entire perimeter. The lateral third of the wound was fully re-epithelialised, while the medial third was nearly so (Fig 1d). The size of the portion yet to re-epithelialise was now 1.2x0.7cm. Transforming powder was applied to the remaining wound and moisturised. Since healing had proceeded so rapidly, follow-up was scheduled for two weeks.

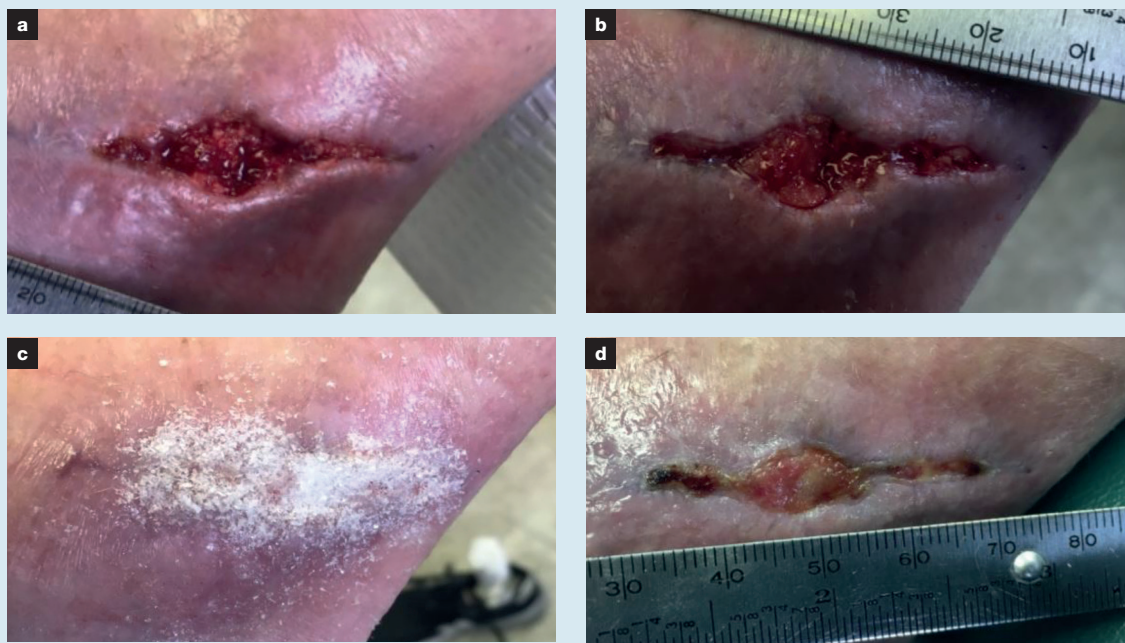
At the third follow-up (four weeks after the initial application of transforming powder), other than a very thin 0.2cm crust at the centre, the wound was

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Fig 1. Case 1, a 78-year-old man with surgical removal of a squamous cell carcinoma. The wound three weeks following surgery with complete loss of the Burow's graft, size 4.0x1.1cm (a). After first application of transforming powder (one week), size 3.7x0.9cm (b). Second application of transforming powder was given at the first follow-up of one week (c). Following the second application (one week) the wound had decrease to 1.2x0.7cm (d)



completely healed (Fig 2). No further treatment was indicated.

Case 2

An 86-year-old woman developed a *Staphylococcal aureus* infection identified by bacterial culture, following surgical removal of a squamous cell carcinoma of the right lateral calf. The infection was eradicated with intravenous and oral antibiotic treatment, along with wound drainage by removal of both layers of sutures from the centre of the closure line. This resulted in a

Fig 2. Case 1, a 78-year-old man with surgical removal of a squamous cell carcinoma. After three treatments over four weeks with transforming powder, the wound was completely healed apart from a very thin 0.2cm crust at the centre



0.7x2.2 cm wound extending to the deep subcutaneous fat (Fig 3a). The options of standard wound care with bacitracin ointment applied 2–3 times a day versus wound treatment with transforming powder were presented to the patient, who chose the latter option. The wound was treated with transforming powder and covered with a transparent film dressing (Nexcare Tegaderm, 3M Company, US) to permit washing of the right lower leg without disruption of the transforming powder dressing. Follow-up was scheduled in one week.

At follow-up the wound showed complete granulation of the base, along with re-epithelialisation of portions of the perimeter (Fig 3b). The wound showed re-epithelialisation of 1–2mm portions of the perimeter. Transforming powder was reapplied and the wound was again covered with a transparent film dressing.

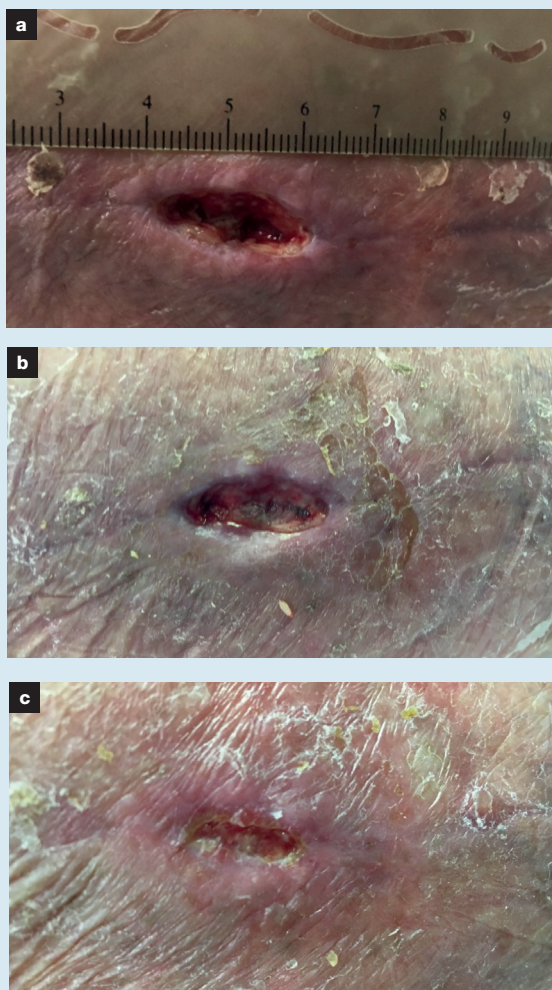
At second follow-up 11 days later (18 days after the initial treatment), the wound was reduced in size to 0.3x1.2cm. The surface was slightly depressed but completely re-epithelialised (Fig 3c). No further treatment was indicated.

Neither patient experienced any adverse events during wound treatment with transforming powder. Following completion of wound healing, the patients were returned to their referring dermatologists for long-term follow-up. After nearly two years, there have been no reports of adverse reactions at the wound sites.

Discussion

Transforming powder dressing changes generally occur

Fig 6. A 86-year-old woman developed a *Staphylococcal* infection following surgical removal of a squamous cell carcinoma. Partial wound dehiscence occurred following infection, wound size 0.7x2.2cm wound (a). transforming powder was added and the wound examined after seven days (b) at which point a second application was given and the wound examined 11 days later, size 0.3x1.2cm (c)



every 7–14 days (although the dressing may remain in place for up to 30 days). The transforming powder dressing is removed easily by saturating with sterile saline and lifting away with forceps. Since the new wound tissue is unable to infiltrate the dressing, dressing removal is accomplished with no harm to the granulating tissue and hence no disruption of the wound healing process. Additionally, this makes dressing changes completely painless and once fresh powder is applied another dressing is formed. The process is repeated until the wound is healed. Neither of our patients experienced any pain or discomfort with dressing change. A significant decrease in pain upon application has been reported in a variety of settings, including pyoderma gangrenosum, sickle cell ulceration, venous leg ulcers (VLU) and split-thickness skin graft

(STSG) donor sites.^{3–5} Possible mechanisms for pain reduction include reduction in inflammation, high moisture vapour transmission rate, Substance P blockade and bacterial toxin binding.^{1,5}

As is evident from these two cases, transforming powder can be used alone or with a secondary dressing. An absorbent secondary dressing can be used in situations with significant exudate, while here a waterproof secondary dressing was used with one patient to allow washing without disruption of the transforming powder dressing.

Finally, the transforming powder dressing eliminates the need for wound care by the patient or a caretaker. Therefore, adherence is not an issue. Furthermore, each of the transforming powder applications for these two patients required only a single-use 0.75 gram blister (unit) of the powder. This makes treatment highly economical, especially when considering that application occurs only every 7–14 days and there is no need for intervening skilled wound care or nursing visits. Such skilled wound care or nursing is generally necessary multiple times per week, especially in the elderly population.

Conclusion

These two case reports demonstrate the ability of a transforming powder to rapidly heal wounds occurring in a notoriously difficult area, namely the distal lower extremity of an older patient. Applications and dressing changes were simple and painless, while compliance and nursing care were non-issues. Healing was rapid and economical. Because of its unique ability to contour exactly to every wound, transforming powder may well have a broad range of potential applications and uses in wound healing. **JWC**

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Reflective questions

- Transforming powder can be applied to a wound in 1–2 minutes and requires no special expertise and minimal training. Are simple, quickly applied products advantageous in your wound care practice
- Is wound pain a significant issue for your wound care patients? Does it significantly affect patient adherence and/or completion of a therapeutic course?
- Is patient non-adherence with a wound care therapy/modality a major obstacle in your wound care practice?