

The Treatment of Second Degree Burns with Dehydrated, Decellularized Amniotic Membrane vs a Nanocrystalline Silver Dressing

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Background

Second degree burns are a common problem faced by patients and medical practitioners. Unfortunately, superficial second degree burns which result in blistering of the skin are frequently not considered major problems, as the majority of them will heal with minimal care. It is important not to trivialize these injuries, but to treat them appropriately in order to prevent infection, minimize fluid and electrolyte loss, control pain, and improve the cosmetic outcome [1]. The use of modern wound dressings is important to improve the healing of these injuries.

Silver sulfadiazine cream has been the treatment of choice for second degree burns for a number of years, however, it requires twice-daily dressing changes and can cause allergic reactions in sulfa-sensitive patients. More recent silver dressings have also been very useful in the treatment of second degree burns. The need for dressing changes every 3–5 days makes these bandages very attractive for patient comfort, and compliance. Unfortunately, evidence has shown that the silver in these dressings may be toxic to rapidly dividing cells such as keratinocytes [2]. The authors of that study do not recommend silver-containing dressings in wounds containing rapidly proliferating keratinocytes, such as second degree burns [2].

In an effort to overcome some of the problems associated with current therapies for second degree burns, there has been renewed interest in an old therapy. Since 1913, fresh amniotic membrane has been used extensively for the treatment of second degree burns [3]. As a result of current concerns about using fresh amniotic membrane dressings on open wounds, attention has turned to a new dehydrated, decellularized amniotic membrane wound dressing (Bioavance; Celgene, USA). Bioavance is a human collagen matrix indicated for the management of non-infected partial thickness and full thickness wounds. The effectiveness of this product compared to a silver dressing for the treatment of patients with superficial second degree burns is presented. A representative case is shown.

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- 2) Poon VK, Burd A. In vitro cytotoxicity of silver: implication for clinical wound care. *Burns*. 2004;30:140-147.
- 3) Trelford JD, Trelford-Sauder M. The amnion in surgery, past and present. *Am J Obstet Gynecol*. 1979;134:833-845.
- 4) Bhatta M, Pereira M, Rana H, et al. The mechanism of cell interaction and response on decellularized human amniotic membrane: implications in wound healing. *Wounds* 2007;19(6):207-217
- 5) Blumenfeld I, Ullmann Y, Laufer D, Livne E. *Annals of Burns and Fire Disasters* 2000;13:22-30
- 6) Innes ME, Umraw N, Fish JS, Gomez M, Cartotto RC. The use of silver coated dressings on donor site wounds: a prospective, controlled matched pair study. *Burns*. 2001;27:621-627.

Methods

After obtaining an IRB approved informed consent, patients underwent burn debridement, photography, and measurement, and were randomized into one of two treatment groups. Burns treated with the decellularized, amniotic membrane received one application of the product and weekly dressing changes with a non-adherent dressing. Burns treated with the nanocrystalline silver dressing had weekly application of the dressing. The time to healing and visual cosmetic appearance of the burn scar were recorded.

Conclusion

Patients treated with the dehydrated, decellularized amniotic membrane product healed by 1.3 weeks compared to 2.6 weeks for the silver dressing. Burn biopsy results showed faster restoration of normal skin architecture in the amniotic membrane treated patients. The amniotic membrane treated group healed with fewer complications and with better cosmetic results than patients treated with the silver containing dressing. The pathological findings on burn wound biopsies in our patient clearly show a potential protective effect on the burned epithelium when used early in the treatment of the injury. Bioavance can support a 140-fold increase in IL-8 secretion from the tissues (4) IL-8 has been shown to enhance re-epithelialization of deep partial thickness skin burns in the guinea pig model*(5). This may explain the rapid healing of these injuries when treated with Bioavance. The fibronectin-containing matrix of Bioavance may stimulate the healing of the burn wound with less scar compared to the increased scar noted by Innes in superficial donor site wounds treated with silver dressings (4,6).

Results

	Bioavance (12)	Nanocrystalline Silver (7)
All Patients (time to healing)	1.3 weeks	2.6 weeks
Avg. Size	114 cm ²	138 cm ²
Single Therapy (time to healing)	1.25 weeks	2.7 weeks
Combined Therapy (2) (time to healing)	1.5 weeks	2.5 weeks
Burns 25-100 cm ² (5 each group) (time to healing)	1.0 week	2.0 weeks



Of note: After seeing the results of this case, the IRB stopped the treatment of the burns with both silver and amniotic membrane dressings because of the marked difference in scar outcome.

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*Correlation of these results to results in humans is not established.