

Limb Salvage through the use of a bioelectric, antimicrobial dressing

Author: James McCoy, M.D., F.A.C.S.; Morehouse School of Medicine Department of Surgery, Atlanta, GA

BACKGROUND

When all other methods of treatment have failed in patients presented with infected, chronic wounds, amputation is oftentimes the unfortunate answer. There was an estimated 1.7 million people with limb loss (excluding fingers and toes) in the United States in 2007, and there are more than 185,000 new amputations performed each year (1). The devastating loss of a limb results in permanent disability and adversely affects the patient's movement, self-image, self-care and quality of life. Before surgeons turn to amputation as a last resort, it is critical that the use of a bio-electric dressing should be explored. A growing body of research has shown the benefits of the synergistic activity of electric stimulation and antimicrobial action (2-4). A novel antimicrobial bioelectric dressing* that exhibits these two mechanisms of action has been clinically observed to initiate healing in chronic wounds that had failed all other methods of treatment (5).

METHODS

A bioelectric, antimicrobial wound dressing was evaluated as an alternative to amputation in a series of case studies at multiple study site locations. Three amputation candidates were treated with a bioelectric dressing, which was applied to the cleansed wound site and covered with a sterile semi-occlusive dressing for a period of 7 weeks to 11 months with 2-3 dressing changes per week. The wounds were observed closely for any signs of healing initiation and epithelialization.

RESULTS

All wounds in the presented case studies healed completely. No adverse effects were reported.

CONCLUSION

Based on the results from the presented clinical case study observations, it appears that the application of an antimicrobial, close-proximity electrically active wound dressing may be effective in facilitating healing of severe, chronic wounds and eliminating the need for amputations. Future studies are needed to determine if the bioelectric dressing is applicable other acute and chronic wound settings.

REFERENCES

1. www.amputee-coalition.org
2. Chu CS, McManus AT, Pruitt BA, Mason AD. Therapeutic effects of silver nylon dressings with weak direct current on Pseudomonas aeruginosa-infected burn wounds. *Journal of Trauma Injury, Infection, and Care* 1988; 28: 1488-92.
3. Huckfeldt R, Flick AB, Mikkelsen D, Lowe C, Finley PJ. Wound closure after split-thickness skin grafting is accelerated with the use of continuous direct anodal micro current applied to silver nylon wound contact dressings. *Journal of Burn Care & Research* 2007; 28:703-707.
4. Becker RO, Spadaro JA. Treatment of orthopaedic infections with electrically generated silver ions. *Journal of Bone and Joint Surgery* 1978; 60-A: 871-81.
5. Sheftel SN. The role of a bio-electric, antimicrobial dressing in the healing of acute and chronic wounds [abstract]. Clinical Symposium on Advances in Skin and Wound Care, Las Vegas, NV. October 2008; (suppl): 217.

Case Study 1 Osteomyelitis

Patient Profile

52 y.o. man presented with a complex infected wound and osteomyelitis of the right foot. Patient was scheduled for amputation.

Co-Morbidity: Insulin-dependent diabetes, hypertension, cardiomyopathy, anemia, mild renal failure, MRSA, peripheral neuropathy.

Wound Profile

Comments: Failed NPWT. Patient had already sustained a left below-knee amputation. Wound was treated with a bioelectric dressing and covered with a sterile semi-occlusive dressing, with dressing changes every 3 days. Negative pressure wound therapy (NPWT)** was reapplied in combination with the bioelectric dressing to reduce edema and facilitate granulation tissue formation to prepare the wound bed for skin grafting.

Initial



1 week



8 weeks + NPWT



8 weeks + Skin Graft



Case Study 2 Recalcitrant wound

Patient Profile

Man presented with multiple refractory wounds on the dorsal and lateral aspects of his left foot. Patient was scheduled for amputation

Co-Morbidity: Immunosuppression

Wound Profile

Comments: Infected wound with exposed tendon and bone, no pulse at wound site. Previous failed treatments included NPWT, Hyperbaric Oxygen Therapy (HBO2).

Initial



5 weeks



7 weeks



Case Study 3 Radiation ulcer

Patient Profile

A 90 y.o. male presented with a non-healing radiation ulcer on the anterior aspect of his right leg for three years. The patient was a left-below-knee amputee and had lost all digits on his right foot due to amputation. Amputation was offered as only solution.

Co-Morbidity: Type-2 diabetes

Wound Profile

Comments: Failed NPWT, HBO2. Hearing loss was reported after 20th dive of HBO2.

Initial



4 months



11 months

