

AN INNOVATIVE BIOELECTRIC APPROACH TO RECALCITRANT WOUNDS

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BACKGROUND

Non-responding wounds, present for years, pose a complex challenge to the practitioner. Even following identification and correction of contributing host factors and implementation of a spectrum of advanced wound therapies (1), some chronic wounds remain resistant to all efforts aimed at initiating healing. Protracted healing spanning over years adversely affects quality of life, with debilitating social and psychological implications and significant financial burden. Innovative technologies to stimulate the wound healing process and reverse recalcitrant wounds are warranted. A novel bioelectric dressing^a that has been observed to enhance wound healing rates (2-3) may provide a targeted approach to the wound microenvironment through the generation of low-level microcurrents at the device surface. The wireless dressing, embedded with a matrix of microbatteries, electrically activates with moisture and generates electric fields with sustained voltages in the range of 0.3 to 0.9 Volts.

METHODS

Two non-responding wounds of complex etiologies that had delayed healing for at least 2 years were followed in this case series. Case #1 was a DFU; patient was recommended for BKA. Case #2 was a recalcitrant VLU with recurring leg ulcers. Both wounds had failed to respond to an assortment of therapeutic modalities ranging from NPWT and synthetic skin substitutes to surgical interventions. Both wounds were treated with a bioelectric dressing covered with secondary dressings that was changed 1 to 2 times a week. Signs of healing initiation were documented at clinic visits.

RESULTS

Healing initiation was observed following the application of the bioelectric wound dressing, with limb preservation in both cases. Rapid improvement in wound closure rate was observed in case 1, with 99% reduction in wound volume at day 175. In case 2, 99% closure was observed at day 63.

CONCLUSION

A bioelectric dressing holds significant promise as a treatment regimen for recalcitrant wounds, particularly in cases where multiple applications of synthetic tissue matrices had been attempted but had failed. The use of a 7-day dressing in the management of the present wounds also reduced need for dressing changes, pointing to possible time and resource savings. Rather than taking on an unnecessary course of protracted healing, the bioelectric dressing should be considered not after other advanced modalities have failed but as the first line of therapy.

REFERENCES

- 1) Widgerow AD. Deconstructing the Stalled Wound. *Wounds*. 2012;24(3)
- 2) Harding AC, Gil J, Valdes J, Solis M, Davis SC. Efficacy of a Novel Bio-electric Dressing in Healing Deep Partial-thickness Wounds in a Porcine Model. *Ostomy Wound Manage*. 2012;58(9):50-55.
- 3) Blount AL, Foster S, Rapp DA, Wilcox R. The Use of Bioelectric Dressings in Skin Graft Harvest Sites: A Prospective Case Series. *J Burn Care Res* 2012;33(3):354-357.

^aProcellera® Wound Dressing, Vomarix Wound Care, Inc., Chandler, AZ USA

^bGraftjacket®, KCI, San Antonio, TX

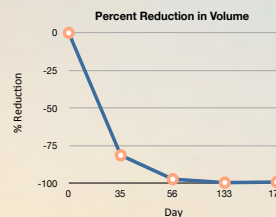
^cApligraf®, Oraganogenesis, Canton, MA

CASE 1: LIMB SALVAGE

- 37 y/o male
- DFU-Grade III
- Acquired 8/1/11
- Recommended amputation but patient refused
- Prior treatments: 3 failed regenerative tissue matrices, off-loading devices, skin flap (failed and amputated), Unaboot, Multilayer compression devices, splinting
- Complicating Dx: DM II (23 yrs), Hemodialysis (5 yrs), ESRD, L Charcot deformity, HTN, Tobacco abuse, morbid obesity, non-compliance with multiple aspects of care including NWB status and off-loading



Initial



Day	L (cm)	W (cm)	D (cm)	Volume (cm ³)
0	10.5	5.2	0.5	27.3
35	8.5	3	0.2	5.1
56	6.9	1.1	0.1	0.759
133	2.2	0.6	0.1	0.132
175	1.7	0.7	0.2	0.238



Day 35



Day 56



Day 133



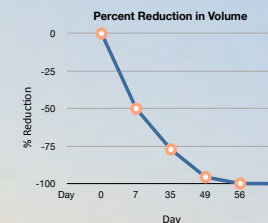
Day 175
Post-debridement

CASE 2: RECALCITRANT WOUND

- 45 y/o male
- Recurrent leg ulcers for over 10 years
- Tri-phasic arterial flow from vascular studies in Jan. 2011
- Complicating Dx: Venous insufficiency, pain in legs with history of DVTs, recurrent ulcerations
- Initiated bioelectric dressing and bi-layered living cell treatment^c on 8/30/11
- 5 Bi-layered living cell treatment applications



Initial



Day 7



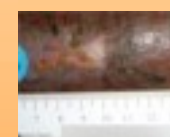
Day 35



Day 49



Day 56



Day 63

Day	L (cm)	W (cm)	D (cm)	Volume (cm ³)
0	4.9	2.5	0.2	2.45
7	4.9	2.5	0.1	1.225
35	3.3	1.7	0.1	0.561
49	2.2	0.5	0.1	0.11
56	0.2	0.3	0.1	0.006
63	0.2	0.2	0.1	0.004