

Assessment of a Microcurrent-Generating Device as an adjunct to NPWT in complex surgical wounds



Laura Harris, Jennifer Hope-Higman, LPN, WCC, DWC, Mary Elizabeth Perez, LPN, Konshawntas Boyd, LPN, Mike Earhart, RN, BSN, MSN, CRNA, Lisa Lynch, LPN, Penny Campbell, PT, CWS, FACCWS, DAPWCA

Trevecca Health & Rehabilitation Center, Nashville, TN
Bethany Health & Rehabilitation Center, Nashville, TN

Background

A multidisciplinary approach is often employed in the treatment of complex surgical wounds, with Negative Pressure Wound Therapy (NPWT) used as a common treatment method. The wireless microcurrent-generating device* (MCD) has been used to treat complex and difficult-to-heal wounds (1-2) and has demonstrated successful outcomes when used as an adjunct to NPWT (3-5).

Methods

We used a wireless microcurrent-generating device (MCD) as an adjunct to Negative Pressure Wound Therapy (NPWT) for the treatment of non-healing wounds in five cases that had previously been treated with advanced standard of care modalities without evidence of healing. The following cases were assessed: three surgically debrided leg ulcerations from venous stasis disease; surgical dehiscence of the right groin from infected peripheral angiography; and an abdominal dehiscence from a ruptured appendix. All patients received the MCD as an interface layer under the NPWT device, which was changed at NPWT dressing changes, where patients were evaluated weekly. NPWT was used until no longer indicated based on facility protocol, after which the MCD was used as a primary dressing.

Results

Wound healing initiation and significant reduction in volume were observed following the application of the MCD as an adjunct to NPWT in all cases. All five wounds progressed without complications or infection. The three wounds of the same patient in cases 1 and 3 reduced in volume significantly. Full closure was achieved in cases 2, 4 and 5.

Conclusion

Based on the findings from the presented case studies, the use of the MCD as an adjunct to NPWT may play an important role in initiating and expediting wound healing in patients necessitating wound healing interventions. Decreased overall healing times can reduce time needed with NPWT, enable the patient to earlier return to home and/or rehabilitation, and restore the patient back to function in reduced time.

References

1. Carley PJ, Wainapel SF. Electrotherapy for acceleration of wound healing: low intensity direct current. *Archives of Physical Medicine and Rehabilitation* 1985; 66:443-6.
2. Wolcott LE, Wheeler PC, Hardwicke HM, Rowley, BA. Accelerated Healing of Skin Ulcers by Electrotherapy. *Southern Medical Journal* 1969; 62(7):795-801.
3. Whitcomb E, Monroe N, Hope-Higman J, Campbell P. Demonstration of a Microcurrent-Generating Wound Care Device for Wound Healing within a Rehabilitation Center Patient Population. *Journal of the American College of Clinical Wound Specialists* 2013; 4(2):32-39.
4. Guberman et al. Preliminary study findings: Faster wound closure is achieved when the bioelectric dressing is used as an adjunct to Negative Pressure Wound Therapy. [abstract]. Presented at the Diabetic Foot Conference, Los Angeles, CA, March 2010 (suppl).
5. Deleon, J et al. The Use of Current Generating Dressings under Negative Pressure. [abstract]. Presented at the Symposium on Advanced Wound Care, Orlando, FL, April 2010; (suppl).

Cases 1-3 Right Lower Extremity Surgically Debrided Wounds

Patient History: 61 y/o female admitted to rehab facility on 9/25/13 following hospitalization for surgical debridement to right lower extremity due to cellulitis and abscess.

Dx: H/O venous insufficiency ulcers, cellulitis, abscess, hypokalemia, renal disease, HTN, Asthma, DM, DVT (H/O), obesity, cardiac failure, anemia, LLE edema, chronic pain, insomnia, CHF, small bowel obstruction, incisional hernia repair, thrombocytopenia.

Treatment and Significant Dates:

9/25/13: RLE wounds 1-proximal site, 2-distal site, 3-lower medial site started on NPWT+MCD, 2x/wk dressing change
11/18/13: Distal site closed
11/18/13: Proximal site no longer required NPWT, continued with MCD and foam dressing with MCD change 1x/wk and foam change 2x/wk
11/28/13: Rt lower medial site-NPWT discontinued to allow greater mobility, ADL rehab with therapy
1/11/14: Patient discharged home



Case 4 Dehisced Surgical Incision-Right Groin

Patient History: 63 y/o male admitted to the hospital on 5/10/13 for mitral valve replacement and a CABG. Admitted to ICU post-op with sepsis, was diagnosed with VRE Endocarditis. Patient suffered a CVA. He had a h/o at least one other CVA prior to this admission. He received a PEG tube on 5/24/13 and also suffered an embolic phenomenon in his right foot. Attempted embolectomy on 5/31/13 with unsuccessful outcome as evidenced by the discoloration in his right foot. On 6/4/13 he underwent a right transmetatarsal amputation due to DVT. Both the right groin and right transmetatarsal surgical incisions dehiscd. Discharged to hospital on 6/27/13 for debridement of the dehiscd right groin surgical site. Re-admitted to rehab facility on 7/3/13. Patient suffered severe UTI during treatment period and received IV antibiotics.

Dx: Post-op infection, MRSA, VRE, right transmetatarsal amputation, CAD, CABG, right groin surgical site infection, DVT, gangrene due to DVT, endocarditis due to VRE infection, multiple CVAs, right hemiplegia, dysphagia, COPD, HTN, hernia, gastritis, right THR, hyperlipidemia, epilepsy, depressive disorder, pleural effusion, aphasia, vitamin D deficiency, DM II, hypokalemia, ataxia, UTI.

Treatment and Significant Dates:

6/13/13: Originally admitted to rehab center. Surgical incision closed with liquid skin adhesive. Monitored daily for changes
6/27/13: Surgical incision open into 2 sites. Discharged to hospital for surgical debridement of the sites.
7/03/13: Re-admitted to rehab facility with NPWT @ 80 mmHg, nanocrystalline silver dressing with dressing changes 2x/wk
7/08/13: Started MCD and NPWT @ 80 mmHg with 2x/wk dressing changes
8/05/13: Discontinued NPWT due to no longer being indicated. Hydrocortisone and foam dressing due to hypergranulation. Changed daily
8/08/13: Changed dressing to MCD, cover change 2x/wk
8/19/13: Wound closed



Case 5 Dehisced Abdominal Surgical Incision

Patient History: 89 y/o female admitted to local acute care hospital on 7/2/13 due to ruptured appendix and resulting abscess. Required resection of cecum and ascending colon. Post-op complications of the surgical wound required NPWT placement. Cultures grew > 3 organisms and anaerobic cultures grew *Bacteroides caccae*, Beta-lactamase positive and *Peptostreptococcus micros*. On multiple antibiotics. TPN due to poor PO intake. Also had some issues with AF and developed pneumonia during her hospitalization. Discharged to rehab center 7/16/13.

Dx: AF, ruptured Appendix with abscess, surgical complications, HTN, osteoporosis, vitamin D deficiency, hypoalbuminemia, aortic atherosclerosis, edema, No MI.

Treatment and Significant Dates:

7/16/13: Admitted to rehab facility.
8/15/13: Started on NPWT
9/3/13: D/C'd NPWT. Continued to use MCD with foam secondary dressing, changes 2x/wk
Wound closed

