Adjuvant muscle pump activator to improve blood flow in patients with lower limb ulcerations related to chronic venous insufficiency

Michele Suitor RN, MN, NP and Ambulatory Wound Team, WestView Health Centre, Stony Plain, Alberta

Introduction
The calf muscle pump generates high pressures that assist in venous blood return against the force of gravity.7,8 Neurally electrostimulation (NEMS) is the common peroneal nerve activates the calf and foot muscle pumps. This in turn increases venous, arterial and microcirculatory blood flow in the lower limbs.1,2 It reduces edema and promotes conditions to support wound healing. The effect of applying electrical muscle pump stimulation on wound healing in patients with chronic venous insufficiency and delayed wound healing beyond expected trajectories is described in this study. Methods and best practice wound management is examined.

Procedure/Method
The muscle pump activator device was applied to two ambulatory wound clinic patients with mixed etiology lower extremity wounds and a history chronic venous insufficiency. The device was applied to both legs over the common peroneal nerve for 6 hours per day, 5 days per week. The devices were applied by the patients during a time of their daily routine of great activity. This was done until wound closure was achieved and for up to one month following to help ensure a more robust healing after closure.

Findings/Results
Wound healing outcomes were found to be improved over standard care with all wounds attaining full closure. Each patient demonstrated an individualized pattern of wound healing, however, healing times were expedited compared to baseline, once the muscle pump activation system was initiated. All patients remained healed one month after the device trial was completed. Secondary findings included a reduced lower leg edema, improvement in subjective pain, a softening of woody fibrosis and an improvement in skin color.

Implications/Applications
The development of adjuvant technologies provides the opportunity to better address health concerns and promote positive patient outcomes. Lower extremity wound care is a challenge to the patients who live with them and to the health care teams developing a treatment plan. Use of an NEMS provides another valuable tool in the wound healing toolbox.

References
3. Williams, KJ et al. (Poster) Vascular Society Annual Scientific Meeting. Glasgow November 2014

Case 1
52 year old woman with history of mild chronic venous insufficiency and surgical removal of bilateral ingrown toenail beds. September 21st, 2015, the device was initiated and within a week, the patient noted improved mobility and reduced pain upon walking. He was discharged with instructions to use the device twice daily and underwent treatment with appropriate HI/U bands for 6 weeks. During that time the toenail beds were monitored, treated with 30-40 mmHg and foot bandages. ABPI 1.64 (L) 1.64 (R). Full healing was delayed for 2 months. Call Procedure: geko™ muscle pump activator device was continued December 15th, 2015. The patient applied the device twice daily and noted marked improvement to his nail beds in 6 weeks. The toenail beds were now pain free and able to walk with only minor skin irritation that settled during treatment. Findings: Following three months of external healing, the patient’s nail beds healed in 6 weeks. The lower leg ulcers were surgically excised, without the patient using adjuvant compression. (NEMS was not used to wear graduated compression stockings because they caused increased pain in her leg.) The patient was able to continue using the device. Subjectively, the patient stated the leg was much less painful and his pain was less when she walked without the device.

Call Procedure: ABPI’s: (R) 1.16  (L) 1.14  Monofilament testing 10/10 bilaterally.

Case 2
56 year old man with history of mild chronic venous insufficiency and surgical removal of bilateral ingrown toenail beds. September 21st, 2015, the device was initiated and within a week, the patient noted improved mobility and reduced pain upon walking. He was discharged with instructions to use the device twice daily and underwent treatment with appropriate HI/U bands for 6 weeks. During that time the toenail beds were monitored, treated with 30-40 mmHg and foot bandages. ABPI 1.64 (L) 1.64 (R). Full healing was delayed for 2 months. Call Procedure: geko™ muscle pump activator device was continued December 15th, 2015. The patient applied the device twice daily and noted marked improvement to his nail beds in 6 weeks. The toenail beds were now pain free and able to walk with only minor skin irritation that settled during treatment. Findings: Following three months of external healing, the patient’s nail beds healed in 6 weeks. The lower leg ulcers were surgically excised, without the patient using adjuvant compression. (NEMS was not used to wear graduated compression stockings because they caused increased pain in her leg.) The patient was able to continue using the device. Subjectively, the patient stated the leg was much less painful and his pain was less when she walked without the device.

Call Procedure: ABPI’s: (R) 1.16  (L) 1.14  Monofilament testing 10/10 bilaterally.

Case 3
60 year old woman with history of mild chronic venous insufficiency and surgical removal of bilateral ingrown toenail beds. September 21st, 2015, the device was initiated and within a week, the patient noted improved mobility and reduced pain upon walking. He was discharged with instructions to use the device twice daily and underwent treatment with appropriate HI/U bands for 6 weeks. During that time the toenail beds were monitored, treated with 30-40 mmHg and foot bandages. ABPI 1.64 (L) 1.64 (R). Full healing was delayed for 2 months. Call Procedure: geko™ muscle pump activator device was continued December 15th, 2015. The patient applied the device twice daily and noted marked improvement to his nail beds in 6 weeks. The toenail beds were now pain free and able to walk with only minor skin irritation that settled during treatment. Findings: Following three months of external healing, the patient’s nail beds healed in 6 weeks. The lower leg ulcers were surgically excised, without the patient using adjuvant compression. (NEMS was not used to wear graduated compression stockings because they caused increased pain in her leg.) The patient was able to continue using the device. Subjectively, the patient stated the leg was much less painful and his pain was less when she walked without the device.

Call Procedure: ABPI’s: (R) 1.16  (L) 1.14  Monofilament testing 10/10 bilaterally.

The geko™ Device
Wearable, non-invasive, easy-to-use technology that heals from the inside-out. It delivers a tiny electrical charge that activates the body’s “muscle pumps” to send blood flow to the wound. It weighs 10 grams in the size of a wrist watch and is self-contained.

1. Two switches (+/-) for adjusting the NEMS stimulation level
2. LED Lights
3. Indicator line to assist with device placement

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Adjunctive muscle pump activator device continued June 2016. The patient was able to continue using the device.

Call Procedure: ABPIs: (R) 1.16  (L) 1.14  Monofilament testing 10/10 bilaterally.

Findings:
Full wound closure was achieved in 6 weeks with the geko™ device continued one month following healing. Secondary findings included a reduced lower leg edema, improvement in subjective pain, a softening of woody fibrosis and an improvement in skin color.

Subjectively, the patient stated his legs were much less painful and his pain was less when he walked without the device.

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