The role of the geko™, a portable neuromuscular electrostimulation device, in assisted healing of an intractable arterial leg ulcer.

Authors: Ms Cheryl Frank Clinical Nurse Consultant and Dr Mark Jackson Consultant Vascular surgeon, Gold Coast Private Rooms, Queensland, Australia.

Introduction

The use of electro-stimulation to heal ulcers where the aetiology has an arterial component is of particular interest, since compression is less suitable as a treatment.

The geko™ device is the first fully portable neuromuscular electro stimulation device, which does not require separate electrodes and console. This affords it the advantage of being discrete and enabling the patient to be fully mobile while wearing the device.

The geko™ device has been shown to augment arterial flow, as well as microcirculation[1], whereas compression therapy generally has a beneficial effect on venous flow only, and may reduce arterial and microcirculatory flows. Where an ulcer has an arterial component to its aetiology, the geko™ device would be expected to be more efficacious than compression, by virtue of the augmentation of arterial inflow. Additionally, since healing any ulcer requires perfusion at the wound bed, the augmentation of microcirculatory flow brought about by the geko™ device is expected to be beneficial.

Subject

Female, 74 years of age.

Relevant clinical history

Past medical history:

- Peripheral Vascular Disease
- Temporal arteritis
- Cerebrovascular accident 2008
- Chronic obstructive pulmonary disease secondary to heavy smoking history
- Smoker up to 30 cigarettes per day
- Moderate intake of alcohol

***Past surgical history*:**

- Left below the knee amputation 2010
- Right popliteal-peroneal bypass graft 2012

Concomitant medication

- Oxycontin 40mg BD

- Endone 10mg PRN
- Endep 25mg
- Serepax 30mg nocte
- Prednisone 1mg M/W/F
- Lipitor 80mg nocte
- Pletal 100mg

Clinical presentation and clinical management:

Following a failed peroneal bypass with restricted blood flow to lower right limb the patient presented with an arterial ulceration of the right foot and gaiter area. The patient was contraindicated for compression therapy due to pain and was therefore only treated with a single layer of tubigrip® stocking, the ulcer was unresponsive to the administered treatment.

Rationale for treating with the geko™ device

The geko™ device was utilised in order to reduce oedema and increase circulation prior to below knee amputation.

The geko™ device treatment regime

Primary use of the device was to enhance lower limb blood flow, increase lower limb perfusion, microcirculatory flow and tissue oxygenation.

The geko™ device was worn for 24 hours per day including during sleeping hours and was replaced by the patient at home as per fitting instructions on a daily basis. The device was applied as an adjunct to standard and previously described light bandage dressing.

The patient was monitored and the dressing changed during weekly visits to the clinic.

Results

Figure 1: Clinical Presentation:

Figure 2: Initiation of geko™ treatment following wound cleaning and debridement:

Figure 3: One week following commencement with the geko™ device, notice the reduction of the oedema and the margin granulation at the edge of the wound.

Figure 4: Two weeks after the initiation of geko™ device treatment a reduction in slough and increase in granulation was observed in the wound base.

Outcome

The utilization of the geko™ device over a three week period delivered significant improvements in the observed oedema, and wound base. The patient also reported improvements in quality of life and verbal pain rating, going from severe pain to moderate pain following treatment. The patient increased her range of ankle movements and was able to tolerate 1 layer of tubular compression bandaging.

The wound base progressed during the course of treatment with a 5mm reduction in wound depth, slough was reduced and an increase in granulation was also observed.

Discussion of geko™ use in venous ulceration

Clarke Moloney et al (2006)[2] demonstrated an increase in venous velocity using electrical stimulation as a treatment adjunct for venous ulceration. A meta-analysis by Gardner et al (1999)[3] reported a 13% net healing rate per week with electrical stimulation, equating to a 144% increase over the control population.

This case supports the work done by Moloney et al, and suggests that the use of geko™ offers a useful treatment option for patients with chronic leg ulcers.

References

1.Tucker, A., et al., Augmentation of venous, arterial and microvascular blood supply in the leg by isometric neuromuscular stimulation via the peroneal nerve. Int J Angiol, 2010. 19(1): p. e31-7.

2. Clarke Moloney, M., et al., Haemodynamic study examining the response of venous blood flow to electrical stimulation of the gastrocnemius muscle in patients with chronic venous disease. Eur J Vasc Endovasc Surg, 2006. 31(3): p. 300-5.

3. Gardner, S.E., R.A. Frantz, and F.L. Schmidt, Effect of electrical stimulation on chronic wound healing: a meta-analysis. Wound Repair Regen, 1999. 7(6): p. 495-503.

firstkind
living science