

AN INNOVATIVE APPROACH TO MANAGE PAIN AND STIMULATE HEALING IN ARTERIAL ULCERS USING ELECTRICAL STIMULATION THERAPY*

Authors

Patricia Terrill - Plastic & Reconstructive Surgeon, Peninsula Health & Senior Lecturer, Dept of Surgery, Monash University, Australia

Liz Ovens - Independent Tissue Viability Specialist Nurse, UK

Aim

Arterial leg ulcers have a significant impact on a patient's quality of life¹, with many experiencing pain, non-healing, risk of amputation and death². Electrical stimulation therapy (EST) has been demonstrated to reduce pain and promote healing in chronic wounds³⁻¹⁰ when used as an interventional therapy alongside standard wound care. A case study was undertaken in Australia, to demonstrate the effectiveness of applying a small, single use, automated electrical stimulation therapy* on pain and wound healing for a patient with a complex, long-standing, painful arterial leg ulcer.



*Accel-Heal (Accel-Heal Technologies Limited – Hever, Kent, UK)

Method

An 84 year old female presented with a 3 year history of a painful arterial ulcer on her right lateral leg. In 2017 she underwent initial surgical debridement with dermal substitute to the superficial peroneal nerve (Fig 1), split skin grafting and topical negative wound therapy, resulting in 50% graft take (Fig 2).

Between 2017 and 2021, the ulcer underwent several surgical debridements and skin grafts along with 10 revascularisation procedures (angioplasties and arterial stents in her common femoral and peroneal arteries) for recurrent re-stenosis despite Warfarin therapy. Infection and severe pain further complicated the ulcer status, despite the application of many topical anti-microbial dressings, intermittent courses of antibiotics and regular analgesia.

In February 2021, the EST* was applied continuously to the peri wound for the 12-day treatment period, alongside moist wound healing dressings and wound bed preparation strategies. Data was collected prior to, during the 12-day EST* and for 12 months following therapy. Wound size, pain score, exudate levels and photographic imagery were undertaken.

Figure 1



Post Debridement, pre skin graft

Figure 2



Post skin graft with partial take

*Accel-Heal (Accel-Heal Technologies Limited – Hever, Kent, UK)

Results

On 04/02/21, prior to the EST*, the wound measured 2cm x 1.7cm with 30% slough, a pale wound base, unhealthy granulation tissue and rolled edges, with moderate exudate (Fig. 3). Pain score was 8/10 on the visual analogue score (VAS).

Following the 12 days of EST, the wound was visibly smaller, measuring 1.8cm x 1.4cm, with 10% slough, less depth and light exudate (Fig. 4). The pain score had reduced to 2/10 (VAS). Three weeks after commencing the EST* (Fig. 5), the wound measured 1.5cm x 1.1cm, with 60% epithelial tissue and 40% granulation.

Unfortunately, a month later her pain score increased to 8/10 (VAS) due to infection and a further stent blockage. (Fig 6).

Figure 3



Day 0. Prior to EST*

Figure 4



Day 12 - Completion of EST*

Figure 5



Day 21

Figure 6



9 Weeks post EST* Deterioration after stent blockage and infection (resolved)

*Accel-Heal (Accel-Heal Technologies Limited – Hever, Kent, UK)

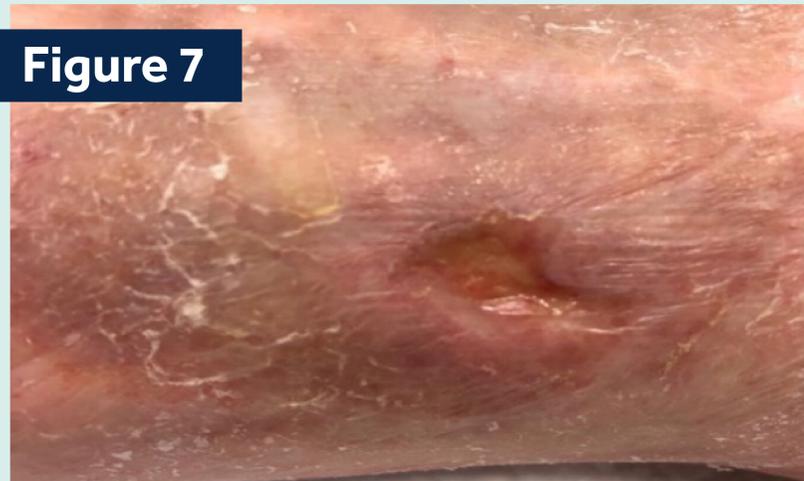
Results (cont.)

Progressive wound healing (Figs 7-9) with almost complete epithelialisation was achieved by 15 weeks, and pain score reduced to 1/10 (VAS). The pain score remained consistently less than in the 5 years prior to the EST*.

She was once again hospitalised in June 2021 with vascular and cardiac issues. A further stent blockage occurred leading to critical ischaemia of the leg. Despite this, the wound continued to heal with moist wound healing dressings and anti-microbials.

Complete closure was noted at 6 months from start of the EST* (Fig 10) and has remained healed with no pain.

Figure 7



14 weeks post EST*

Figure 8



15 weeks post EST*

Figure 9



15 Weeks post EST* Close-up

Figure 10



Wound healed 6 months from start EST*

Conclusion

The patient was very distressed by the wound pain prior to the EST* and required long term, long acting narcotic analgesia. The relief of healing the wound after so many years has been wonderful for her, as she lives alone and was struggling to cope with managing the wound, pain medication and dressing regime. The clinical team in Australia were delighted to see this long-term wound remaining healed, and now considers this EST* to be a treatment option for other challenging wounds that are not responding to routine treatment.

Arterial ulcers are notoriously difficult to heal, despite vascular interventions, with pain being a major factor affecting quality of life. Application of an easily operated, wearable and pre-programmed EST* can reduce pain and stimulate wound healing in conservatively managed patients.

Conflict of interest:- The second author works as an Independent Tissue Viability Nurse and was sponsored by Accel Heal Technologies Limited, to help facilitate this article.

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