

# Use Of A Muscle Pump Activator To Treat A Left Ankle Wound

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*This case study reports on a 68-year-old woman with a long-standing recurring wound which was the result of a traumatic ankle injury requiring an open reduction and fixation. It describes the use of a muscle pump activator (MPA) as part of the wound management strategy and its impact on wound healing.*

At the age of 63 the patient was referred to the Community Outpatient Clinic (COC) and followed over the course of five years, from 2019 to 2023. On initial assessment the client presented with a long-standing chronic wound. Her lower leg skin was warm to touch, fragile, hairless, scarred, and mottled. There was significant hemosiderin staining, stasis dermatitis, atrophie blanche, puritis, varicosities, moderate left leg edema at 2+ 4mm up to mid calf and intermittent generalized pain which is indicative of venous disease.<sup>1</sup>

The left and right dorsalis pedis and posterior tibial pulses were both palpable and biphasic and cap refills were less than three seconds, suggesting normal arterial blood flow.<sup>2</sup> She had full sensation of the foot and toes and her ABPI's were within normal range (Left=1.03 and right=1.08).<sup>1</sup> The client reported pain when lying down which was relieved when the limb was dependent. This would indicate an arterial component.<sup>1</sup> Based on these clinical findings, this

wound was managed as mixed arterial venous disease with a heavy focus on venous congestion.

Approximately 15 to 25% of patients with venous disease will also have some arterial insufficiency.<sup>1,2</sup> In a recently published paper by Professor Keith Harding et al. (2025) it was reported that, "the MPA [muscle pump activator] device is effective in significantly increasing microvascular flow in leg ulcers with combined venous and arterial etiology."<sup>3</sup> The range of motion of her knee was normal, however, due to prior surgery, the ankle fusion resulted in complete ankle rigidity. The client had developed wound infections over the course of treatment and was treated with parenteral and oral antibiotics and antimicrobial dressings. A Tagged White Blood Cell Scan ruled out hardware infection.

The client maintains a healthy, active lifestyle, and follows a nutritious, protein-rich diet to support optimal wound healing.

She is a non-smoker and non-drinker. These factors support wound healing, however she has some isolation based social determinants of health, which are known predictors for delayed lower leg ulcer healability.<sup>1</sup> She maintains strong community involvement, which provides a social and functional support that may help mitigate these risks.

Evidence-based best practices were used with the following treatment modalities: compression socks 20-30mmHg, 2-layer compression wraps, antimicrobial soaks, Iodine based topical antimicrobials, Silver based products, Methylene Blue/Gentian Violet foam dressings, Biochemical Modifiers, Polyhexamethylene Biquanide, Silver Nitrate to wound edges. Unfortunately, the wound did not respond to these therapies.

## Discussion

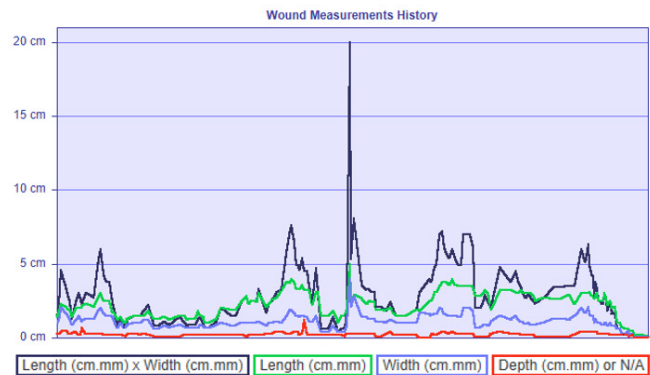
The failure of the client's calf muscle pump due to ankle immobility was a primary etiological factor in this wound not healing. According to Meulendijks et al. (2018), cited in Evans et al 2025, calf-muscle dysfunction is a strong predictor of VLU severity and healing.<sup>1</sup> The calf muscle pump, often called the second heart, returns the largest volume of blood to the heart, more than all other veins in the circulatory system. Based on the current literature it was decided to implement the MPA device using the Wounds Canada Best Practice Recommendations and the Canadian Consensus document.<sup>1-3</sup>

The MPA increases venous, arterial and microcirculatory blood flow to the lower extremity, optimizing wound healing two-fold.<sup>3-7</sup> In a recent article published by Professor Keith Harding et al. (2025), flux, the exchange of blood, oxygen and nutrients within the wound bed, increased by 38% to the wound bed and 95% to the periwound. The pulsatility, the rhythmic

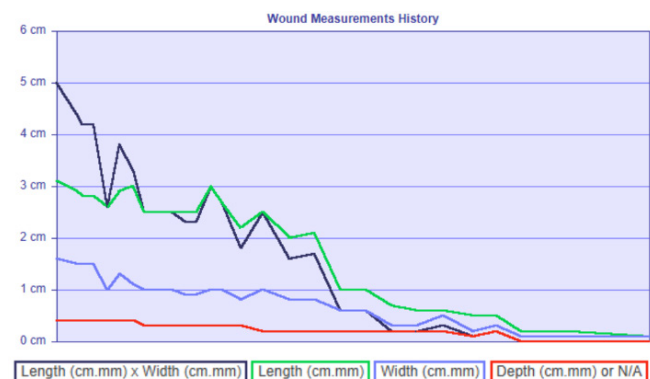
variation of blood flow, increased by 95% to both the wound bed and the periwound.<sup>6</sup> For this client, the numbers show a greater improvement. The MPA was initiated May 16, 2023, and by September 5, 2023 wound closure was achieved and the MPA was stopped shortly after, on September 11, 2023. After not healing for 1467 days, it healed with the MPA within 112 days. See Calculating Time to Closure on following page for a detailed calculation.

**Figure 1:** This graph represents the measurements of the wound for the full duration of treatment from May 11, 2019-Oct 23, 2023.

*Graph auto populated from Pixalere™*



**Note dated range listed is May 16, 2023-Sept 11, 2023, MPA initiated May 16th.**



**Demonstration of healing with the MPA in 16 weeks 210 weeks of non healing with standard wound care.**

## Initiating The MPA Device

On May 16, 2023, the MPA device (Firstkind Ltd., UK) was initiated. The fibular head was identified and marked with an indelible marker. The device was worn 12 hours/day, seven days/week as per the manufacturer's recommendation.<sup>8</sup> The client was able to self-manage both compression and the MPA application. Self management supported the client's independence, while reducing the number of nursing visits. The client developed a contact dermatitis over the application (See Figure 2) and alternate placements sites were used as recommended by the manufacturer.<sup>8</sup> A glucocorticoid steroid spray effectively managed this inflammation, and the client was able to continue with therapy.

### Calculating Time to Closure

- Initial non-healing period: From May 11, 2019, to May 16, 2023 → 1467 days
- Healing period with MPA: From May 16, 2023, to September 5, 2023 → 112 days

Wound Healing Rate Calculation: Initial Wound Area-Current Wound Area/Time Lapsed.

- Without MPA: (14mm x10mm)-(31mmx16mm)/1467days= -0.24mm<sup>2</sup>/day. (Initial wound area - wound area on the day of starting MPA/total days before MPA).
- With MPA: (31mm x 16 mm)-( 5mm x 2mm)/112days= 4.34mm<sup>2</sup>/day. (Wound area day of MPA initiation - final wound area / total days with MPA).

With the MPA, this client achieved wound closure in 16 weeks compared to a chronic non-healing period of over four years.

**Figure 2:** Baseline to Closure



**May 16, 2023-Baseline.**



**June 29, 2023 after 6 weeks and 2 days of MPA treatment.**



**August 7, 2023 after 11 weeks and 6 days of MPA treatment.**



**September 5, 2023, after 16 weeks of MPA treatment.**



**Contact dermatitis which was managed with a glucocorticoid steroid inhaler applied to the application site of the MPA device.**

## Conclusion

The use of the MPA device for this patient resulted in a significant and positive outcome. This wound went from four years of non healing to closure within 16 weeks, with an increase in healing rate from  $-0.24\text{mm}^2/\text{day}$  to  $4.34\text{mm}^2/\text{day}$ . The patient reported high satisfaction with the therapy and the nursing staff found the device easy to integrate into standard wound care. The client was able to transition to compression hosiery to maintain closure and prevent recurrence. The clinical implication is that clinicians have a viable option to improve wound healing outcomes using the muscle pump activator device.

## Disclaimer

No financial or similar considerations were provided by Firstkind Ltd.

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