Performing better under pressure: a case study on the use of topical negative pressure in conjunction with a three-layer compression system for the treatment of a hard-to-heal lower leg ulcer

Douw Greeff Memorial Poster presentation

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Introduction

Despite medical advances, chronic venous leg ulcers are still a very common and costly problem worldwide. Africa, as a continent, also faces an increase in the incidence of chronic diseases, like diabetes mellitus. The burden of venous lower leg ulcers is expected to rise with an ageing population and the growing epidemic of diabetes mellitus and obesity. This, coupled with chronic venous insufficiency, reduces quality of life and increases healthcare costs as these ulcers may take a very long time to heal. Little data are available on the prevalence of or treatment regimens for patients with venous lower leg ulcers in South Africa. The aim of this case study was to report on the effectiveness of combining the current gold standard for venous lower leg ulcer treatment (compression therapy) with topical negative pressure (TNP) therapy to treat a large surface area lower leg ulcer that was not responding to treatment. This combination treatment not only improved the outcome for the specific patient, but demonstrated that topical treatment alone is insufficient. In addition, associated exacerbating factors must be addressed when managing lower leg ulcers.

Chronic venous disease is the seventh most common chronic disease in the world, and is the underlying cause of 40-80% of leg ulcers.[1]

Compression therapy is seen as the gold standard for the treatment of venous lower leg ulcers as it been proven to restore valve competence and reduce ambulatory venous pressure, thus reducing venous reflux.[2] Topical negative pressure was chosen not only as a dressing, but as a treatment modality with the following additional properties:

- *Accelerated granulation tissue formation:* The wound was deep, and a large amount of tissue formation was needed to fill the deficit.
- *Management of the exudate level:* The exudates level was very high, not only owing to the size of the wound, but also because of the location, i.e. the lower leg.
- *Removal of interstitial fluid:* This results in a reduction in oedema.
- *Reduction in the bioload:* This is achieved by removing infective material.[3]

Case study

A 32-year-old woman presented with a large surface area lower leg ulcer, which she has had for more than 11 years. The patient had received several different topical treatments, as well as compression therapy, but the wound did not heal. She presented with an extensive full-thickness ulcer on her lower leg with associated haemosiderin staining, oedema, eczema and lipodermatosclerosis.

Factors that influenced healing included:

- Morbid obesity.
- Hypertension.
- Diabetes mellitus (non-insulin dependant).

Details of the initial assessment and photographs taken of the patient's wound from days 0–38 are provided in Figure 1.

Conclusion

The use of topical negative pressure therapy or compression therapy as separate treatment modalities has been proven to be very effective for the treatment of venous lower leg ulcers.[3] However, the use of topical negative pressure therapy, in combination with compression therapy, resulted in an improved outcome for the patient in this case study. The patient experienced a reduction in treatment time, the effective management of venous stasis and exudate, and the added benefits of negative pressure therapy, i.e. the expedition of granulation tissue, exudate management and micro and macro strain. Although negative pressure and compression therapy are both seen as the separate gold standards for the treatment of venous lower leg ulcers, the two modalities are not commonly used together. This is because typically, medical aids in South Africa do not permit the use of both modalities simultaneously. The aim of this case study was to emphasise the fact that it is of the utmost importance to treat the underlying cause when dealing with venous lower leg ulcers.[7]

Initial assessment: Day 0

The wound measured 23 x 30 x 3 cm. The exudate level was very high, with an offensive odour. There were areas of slough (20%). The wound edge was slightly rolled. The ABPI measured 1 mmHg.[4,5] The pain level was 10/10.

Treatment regime

The wound was irrigated with saline. TNP was applied at –125 mmHg on a continuous setting. Three-layer compression therapy was chosen as adjunctive therapy to reduce oedema and manage venous stasis.[2,6] A silicon wound contact layer was chosen to help reduce pain on removal of the dressing during dressing changes. The dressing was changed every second day and three-layer compression re-applied.

Post-initialisation of therapy

Day 4

The wound now measured 17 x 26 x 1.9 cm. Ninety percent of the granulation tissue was viable. The oedema had reduced. The leg circumference had reduced by approximately 7 cm. Treatment was repeated as before.
Note: Adherence to the treatment was problematic as the patient switched off the negative pressure machine. The poor management of the wound exudate resulted in maceration of the surrounding skin. The patient was educated about this.

Day 14

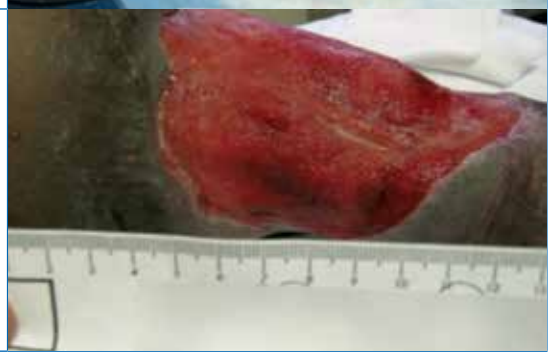
The wound size reduced to 15 x 22.5 x 0.9 cm. The treatment regime was applied, as before. TNP and three-layer bandaging were applied every 3-4 days. The TNP setting remained at –125 mmHg pressure and on the continuous setting.

Day 24

The wound size reduced to 14 x 20 x 0.9 cm, but the tissue superior to it was oedematous because the compression bandage had moved down, resulting in an indentation in part of the leg. Compression had to be adjusted and re-applied over a period of 24-48 hours to manage this.

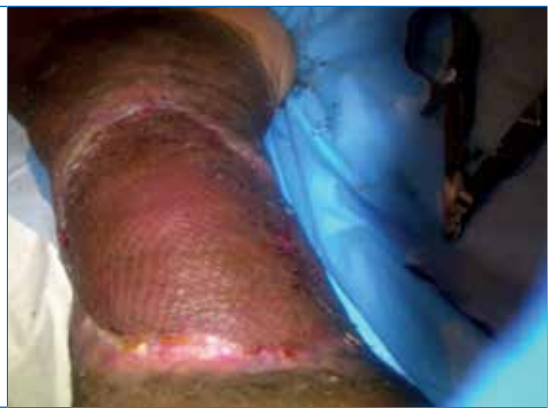
Day 34

The wound size reduced to 13.5 x 18.5 x 0.5 cm. It comprised mostly granulation tissue. There was a significant reduction in pain since inception, a score of 5/10 using the Wong-Baker FACES® Pain Rating Scale.



Day 38

The wound bed was assessed by a surgeon, and found to have been prepared well enough for a graft. The photograph was taken by the patient herself and sent to us post discharge.



ABPI: ankle brachial pressure index, TNP: topical negative pressure

Figure 1: Details of the initial assessment and photographs taken of the patient's wound from days 0–38

References

1. Harding K, Dowsett C, Fias L, et al. Simplifying venous leg ulcer management. Consensus recommendations. Wounds International [homepage on the Internet]. 2015. c2015. Available from: http://woundsinternational.com
2. O'Meara S, Cullum NA, Nelson EA, Dumvillle JC. Compression for venous leg ulcers. [Cochrane review]. In: The Cochrane Library, Issue 11, 2012. Oxford: Update Software.
3. Dowsett C, Gothie L, Henderson V, et al. Venous leg ulcer management: single use negative pressure wound therapy. Br J Community Nurs. 2013;Suppl: S6, S8-10, S12-S15.
4. Mulder M, Smal N, Botma Y. Basic principles of wound care. Cape Town: Pearson Education South Africa, 2002.
5. Vowden P, Vowden K. Doppler assessment and ABPI: Interpretation in the management of leg ulceration. World Wide Wounds [homepage on the Internet]. 2002. c2014. Available from: http://www.worldwidewounds.com/2001/march/Vowden/Doppler-assessment-and-ABPI.html
6. Burrows C, Miller R, Townsend D, et al. Best practice recommendations for the prevention and treatment of venous leg ulcers: update 2006. Adv Skin Wound Care. 2007;20(11):611-621.
7. Ghauri ASK, Nyameke IK. Leg ulceration: The importance of treating the underlying pathophysiology. Phlebology. 2010;25 Suppl 1:45–51.