

The use of negative pressure wound treatment as an aid in plastic surgery on a traumatised foot

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Introduction

Thousands of years ago, the Chinese were applying cups containing heated air to wounds so that, when the air inside them cooled, there would be a slight reduction in pressure. In Europe this method arrived in the 19th century, as a circulatory stimulant¹.

More recently, studies dating back to 1952 may be found, as well as more recent papers (from the mid-1980s onwards) that document the beneficial effect of the application of subatmospheric pressure to the wound bed (negative pressure wound therapy or NPWT) in an unequivocal way, in terms of acceleration of the healing process, although the exact physico-chemical mechanisms that lead to this have not yet been fully clarified.

Modern negative pressure wound therapy involves the use of a suction unit (electric pump) or connection to a hospital vacuum line with a system to apply negative pressure to the wound through a sealed dressing. There are a number of suppliers of NPWT equipment that differ mainly in the ways in which the negative pressure is applied to the wound bed, and there is ongoing debate about which way is more efficacious².

The two principal methods are the Argenta-Morykwas method, which uses a polyurethane foam dressing, and the Chariker-Jeter method, which uses a silicone drain and moistened antimicrobial gauze. In both cases a transparent dressing is used to seal the wound.

The aim of this study is to document our experience managing a wound (in this case, an infected trauma wound) using the VENTURI™ NPWT system produced by British company Talley Medical.

Assessment of the patient and wound

The patient, a 38 year old man with no clinical history of note, suffered a trauma that crushed his left foot in February 2008, and was diagnosed with fractures of the II, III and IV metatarsal and of the distal third of the tibia.

After emergency surgical reduction of these fractures with placement of Kirschner wires, the patient reported the onset of a skin problem on the back of the left foot, that developed into cutaneous eschar. Dressings and targeted antibiotic treatment did not produce any significant improvement.

On 4th March curettage of the wound and tangential escharectomy of the back of the left foot were performed. After the operation, there was a loss of tissue measuring approximately 15cm x 6cm maximum diameter, corresponding to the distal portion of the left foot, with no involvement of the toes, with poorly defined irregular edges and clear limits. The



Initial appearance of the wound, before and after curettage and escharectomy

extensor tendon of the III, IV and V radius was partially exposed. The surrounding skin was erythematous and oedematous.

The wound was photographed for the first time on that date, and its development was subsequently documented photographically.

Method

Talley VENTURI™ is an NPWT system with a mains or battery suction pump that uses the Chariker-Jeter method already described (moistened gauze and silicone drain) to apply negative pressure to the wound.

Once the wound was cleaned a piece of antimicrobial gauze, trimmed to size and moistened with saline solution, was placed on it. The flat silicone drain contained in the wound sealing kit, trimmed to fit and wrapped in additional moistened antimicrobial gauze, was positioned over this layer. The whole dressing was then sealed to the skin with a transparent film dressing. To seal the tubing, part of the gel patch supplied was applied at the exit point of the suction tube. The suction was then applied, setting the Talley VENTURI™ system on continuous therapy mode at 80mmHg. The dressing changes were every 2-3 days and the canister was changed when it became full.

Bacteriological culture tests were performed when the dressings were changed in outpatients, the last of which, performed on 14th April, isolated colonies of *S.Areus*. Treatment with teicoplanin (Targosid™) 400mg per day and sulfamethoxazole + trimethoprim (Bactrim™) 320mg per day was started.

On 24th April the patient underwent reconstruction of the skin substance lost, by positioning a partial thickness dermo-epidermal graft taken from the left thigh.



Appearance of the wound on 2nd April



Appearance of the wound on 7th April



Appearance of the wound on 16th April



Appearance of the wound on 2nd May

The graft was again treated with the application of the VENTURI™ system, which remained in place for a further 5 days.

Results

The VENTURI™ negative pressure system allowed good tissue granulation to be obtained in the first phase, after surgical debridement, with progressive covering of the exposed tendinous structures, promoting the preparation of the wound bed for application of the covering dermal epidermal graft.

The VENTURI™ also allowed the graft to attach quickly, and faster recovery of the lost tissue.

The above images show the evolution of the wound.

Evaluation

Medical staff found application and placement of the moistened gauze dressing simple and fast, and easily adaptable to the irregular edges of the wound. The VENTURI™ suction unit proved easy to use and very quiet.

Talley VENTURI™ proved to be an effective aid in the preparation of the wound, and allowed faster attachment of the transplanted flap.

Conclusion

Wounds such as this one are often hard to manage, particularly when infections develop, as in this case. However, the use of negative pressure can provide a valid aid in speeding up the healing process.

In this field, Talley VENTURI™ is an alternative to the traditional treatment methods, proving to be efficient, easy to use and economical.

References

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2. Miller, M.S., Lowery, C.A. (2005) Negative Pressure Wound Therapy: "A rose by any other name". *Ostomy Wound Management*, 2005 Mar; 51(3):44-6, 48-9

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