Portable Negative Pressure Wound Therapy Leading to Rapid Resolution of Pain Associated with Poorly Healing Wounds of the Lower Limbs

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Abstract

Negative Pressure Wound Therapy (NPWT) has been in use for over 15 years. It has been shown to promote granulation tissue and stimulate angiogenesis thereby improving wound healing. Traditionally NPWT is bulky making it use in the outpatient setting a challenge. A portable negative pressure wound system has been developed, facilitating its use in the outpatient setting. We present 4 cases highlighting our experience with portable NPWT. Rapid resolution of pain was observed in ¾ cases following the application of portable Negative Pressure Wound Therapy (NPWT). We believe portable NPWT is a valuable therapeutic option in the management of painful chronic wounds.

Keywords: Portable negative pressure wound therapy; Negative pressure wound therapy; Pain relief; Analgesia; Lower limb wounds

Introduction

Negative pressure wound therapy (NPWT) has been in use for over 15 years, having first been introduced by Morykwas et al and Argenta et al. [1,2]. It has been shown to improve wound healing by promoting granulation tissue, stimulating angiogenesis and reducing bacterial counts [1-4]. Traditionally NPWT has been complex and bulky making its use in the outpatient setting challenging. A compact, canisterless version of a negative pressure wound system has been developed (PICO®). This has revolutionized NPWT, facilitating its use in the outpatient setting without compromising on function [4]. The PICO® system delivers a negative pressure of 80 mmHg to the wound bed. The device needs to be replaced every 7 days. Over 80% of wound exudate is managed via evaporation through a highly breathable film within the dressing [4]. Traditionally the VAC dressing uses negative pressure of 125 mmHg. This was based on a study showing that blood flow increased 4 fold with a negative pressure of 125 mmHg. Negative pressure of 400 mmHg or greater resulted in inhibition of blood flow [1]. Negative pressure of 125 mmHg was therefore selected for future studies and clinical use. A later study used laser Doppler to measure blood flow during NPWT. This study suggested that optimal negative pressures were closer to 100 mmHg for muscular tissue and 75 mmHg for subcutaneous tissue [5]. It has also been suggested that intermittent negative pressure may improve blood flow as compared to continuous negative pressure.

Cases

We present a single centre experience of our use of portable NPWT (PICO®). A 76-year-old female had a plaque of Bowen’s disease excised from her right lower limb. The surgical defect measured 3.0 × 2.7 cm. The wound was left to heal by secondary intention. Her past medical history was significant for diabetes and peripheral vascular disease, making her unsuitable for compression dressings. The postoperative wound was painful and slow to heal in spite of 2-3 months of intensive wound management. This included Debrisoq®, Flaminal® hydro, Atrauman®, Mepilex® border, Polyfax® ointment and Duoderm® dressings. The PICO® device was applied for 6 weeks, with weekly dressing changes. This resulted in promotion of granulation tissue with a significant reduction in both the depth and diameter of the wound. Her pain resolved within 24 h of application. Following NPWT, the area was covered with Polyfax® ointment and Duoderm® dressings. The lesion has completely healed. An 80-year-old female had a malignant melanoma excised from her right lower limb. The wound was partially closed with a purse string suture, leaving a surgical defect of 2.8 × 1.8 cm. This was painful despite regular analgesia (paracetamol). Initially she was treated with Polyfax® ointment and Duoderm® dressings. The wound failed to improve. NPWT (PICO®) was applied for 4 weeks, with weekly dressing changes. This resulted in promotion of granulation tissue. Her pain resolved within 24 h and regular analgesia was no longer required. The remaining wound was treated with Polyfax® ointment and Duoderm® dressings. The wound has fully healed. A 92-year-old female had a patch of lower limb Bowen’s disease shaved excised. The surgical defect was measured at 3.6 × 2.8 cm with a depth of 0.8 cm. The wound was left to heal by secondary intention. The wound was painful despite regular analgesia (paracetamol & tramadol). PICO® was instituted for 5 weeks, with weekly dressing changes. This resulted in promotion of granulation tissue and a dramatic and rapid reduction in the level of pain at the site within 24 h. The remaining lesion was covered with Polyfax® ointment and Duoderm® dressings. The lesion has completely healed. A 64-year-old male post bone marrow transplant had a chronic postoperative ulcer (previous excision of aggressive squamous cell carcinoma and subsequent placement of a split thickness skin graft followed by adjuvant radiotherapy) related to sclerodermoderm GVHD and radiation fibrosis at the suprasternal notch. The defect measured 50 × 39 mm. Intensive wound care included gentle debridement with Debrisoq®, hydrogen peroxide washes, in addition to Polymem®, Mepilex®, Aquacel® and Clinisorb® dressings. A trial of PICO® was instituted for 4 weeks, though failed due to an inability to form a complete seal due to the contours of the anatomic site and neck movement.

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Discussion

We present 4 cases highlighting our experience with portable NPWT (PICO®). We propose that portable NPWT kick started wound healing in three difficult, painful surgical wounds in elderly patients with significant medical comorbidities. We believe that portable NPWT promoted the development of granulation tissue and resulted in a reduction of wound depth. This ultimately led to wound healing in 3 of 4 cases. Rapid resolution of pain was near immediate in 3 cases and this is the most impressive finding in our case series. Fraccalvieri et al. [6] evaluated pain during dressing changes and noted less pain was experienced when gauze was used rather than foam. To our knowledge, we are the first to report rapid and significant pain relief associated with the application of negative pressure wound therapy. One of our 4 cases failed treatment due to an inability to achieve a complete seal. We believe portable NPWT is a valuable additional therapeutic option in the management of painful chronic wounds and especially so in lower limb wounds of the elderly who may have medical co-morbidities that would tend to hinder the wound healing process.

References