Case Report

Vacuum Assisted Closure Therapy: Revisited

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ABSTRACT

A case of foot wound successfully treated with vacuum assisted closure is described. (Rawal Med J 2008;33:121-122).

Key Words: VAC, wound reconstruction, skin grafting.

INTRODUCTION

The vacuum assisted closure (VAC) therapy was first reported in 1990s.1 It has been used to assist wound closure in plastic and reconstructive procedures.1-3 Edema in wounds increases capillary stasis, which in turn produces capillary thrombosis and thereby reduces microcirculation.4 The rationale behind its use was that negative pressure spread along the surface of an open wound removes edema fluid and tissue debris to decrease the blood perfusion.1,5 The reduction of edema combined with the application of negative pressure forces enhances the formation of granulation tissue, and the VAC technique has been shown to effectively stimulate healing by secondary intention.1,5 We describe a case in which VAC therapy was used and resulted in quicker wound closure.

CASE REPORT

A 36 years old male presented after 3 days of the devastating earthquake that hit the Northern areas of Pakistan on 8th October 2005. He had multiple injuries and a wound on
the dorsum of the right foot with the exposed tendons. The condition of the wound was very dirty with signs of infection (Fig.1.A). After initial surgical debridement, VAC was applied which was changed after every 48 hours (Fig.1.B). The VAC device consisted of a double layer of ½ inch thick open cell foam into which was embedded an evacuation tube of 16 or 18 Fr. The tube was connected to a 5ml syringe. The tube from collection container of vacuum pump was placed inside the syringe.

**Fig 1. Progress of wound with VAC therapy.**

![Pre-operative (A) VAC application (B) At the end of VAC therapy (C)](image)

The foam was soaked with Pyodine® and trimmed and fitted according to the dimensions of the wound, and was applied in direct contact with the base of the wound. Pre-op drapes
(Opsite®) were used extending 3-5 cm beyond the margins of the wound to create an airtight seal. For first 24 hours, 125-150 mmHg of continuous negative pressure was applied and then shifted to intermittent pressure cycles of 20 minutes ON and 5 minutes OFF for the next 24 hours. After 48 hours of VAC, dressing was changed. The wound was thoroughly washed with normal saline and VAC was re-applied. The same routine was continued until a satisfactory clean wound bed was obtained for the final procedure (skin graft or flap).

The culture of tissue revealed *Pseudomonas* species for which he received parenteral antibiotic. After 7 VACs, the condition improved with granulation tissue formation (Fig.1 C). Skin grafting was done and after regular follow-up visits, the wound healed with good results (Fig.2).

**DISCUSSION**

VAC technique in 300 patients with non-healing ulcers showed a 99% success and improved results were reported in patients with chronic osteomyelitis. The precise mechanism by which VAC negative pressure technique effects wound closure is unknown. Morykwas et al\(^5\) showed in a pig model that peak blood flow levels were 4 times higher than baseline values with continuous pressure of 125 mmHg. They also found a significantly higher rate of granulation tissue formation and a significant decrease in bacterial flora after 4 to 5 days of treatment. The removal of excess exudates from the wound is believed to remove inhibitory factors which inhibit vascularity. These fluids contain high levels of matrix metelloproteinases and their degradation products and these have been shown to suppress the proliferation of keratinocytes, fibroblasts and vascular endothelial cells in vitro.\(^7\) Prospective, randomized trials have showed a decrease in the
ulcer volume and in the mean number of polymorphous neutrophils and lymphocytes in wound treated with VAC.³

Fig. 2. Wound on dorsum of foot after skin grafting.

Immediate Post op (A)                               After 3 months (B)

We used sub-atmospheric pressure of 125 mmHg which is similar to the pressure used in most of the other studies.¹,⁸ In another study,⁹ black polyurethane foam (PU) and white polyvinyl alcohol (PVA) foam were used. VAC technique may cause infection, bleeding, increased pain, bad odor, toxic shock syndrome and anasarca.¹,³,¹⁰ In conclusion, VAC is a useful adjunct to the standard treatment of chronic wounds. It is an extremely simple modality and does not require expansive equipment.
REFERENCES


