ORIGINAL ARTICLE

Simple and Cost Effective Technique of Vacuum Dressings on Wounds with External Fixators

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ABSTRACT

Background: Lower limb wounds with exposed bones have typically shown remarkable results with Vacuum Dressing leading to simplification of reconstruction ladder from a complex flap to skin grafting. Vacuum Dressing has always shown problems in wounds with external fixation devices due to multiple pins that fail to create an absolute air tight dressing. We described a simple and cost effective method of dressing that effectively creates sub-atmospheric pressure on wounds with external fixators.

Methods and Materials: Two years prospective study (2016 - 18) conducted at a teaching hospital in Karachi. Patients with lower limb open fracture, who gave consent for the study, were included. Fractures were managed with external fixator and had no exposed bare bone, tendon or neuro-vascular structure. Fabricated vacuum assisted dressing was applied (detailed below) to prevent leakage from metal work.

Results: Sixteen patients gave consent for inclusion in the study. All had granulation at the end of Vacuum Dressing sessions. We had 95% graft take on the wounds.

Conclusion: We highlight an easy and effective fortification of Vacuum Dressing, especially when metal frames open wounds. It works just like a tradition all Vacuum Dressing system and is significantly cost effective.

Keywords: *Vacuum Dressing, Polyurethane foam, External fixator, wound healing, lower limb coverage.*

Introduction

Negative pressure wound therapy also known as vacuum-assisted closure (Vacuum Dressing), in one form or other, has been in field of medicine and surgery since 1940, but it has rapidly gained its popularity since last two decades[1,2]. The system comprises of a machine that creates sub-atmospheric pressure within a polyurethane foam with resting pore size of 400 to 600 μm covered with semi-occlusive dressing[3]. It promotes formation of granulation tissue by increasing blood flow, reducing exudates and bacterial count [4,5]. Lower limb wounds with exposed bones have typically shown remarkable results with Vacuum Dressing leading to simplification of reconstruction ladder from a complex flap to skin grafting[6].

Despite having several benefits over wound healing, Vacuum Dressings has shown problems in wounds with external fixation devices. Multiple metallic pins in external fixators always bring challenges for reconstructive surgeons to create an absolute

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air tight dressing. Failure in doing so does not lead to formation of negative pressure which is the mainstay of the treatment. We will describe a simpler and cost effective method of dressing that effectively creates sub-atmospheric pressure on wounds with external fixators.

Materials And Methods

Two years (November, 2016-2018) prospective case-series was done at the department of plastic and reconstructive surgery, Liaquat National hospital, Karachi. All patients who sustained open lower limb long bones fracture and were managed with external fixator were consented to participate in the study. Wounds had adequate soft tissue on bone, tendon and neurovascular structures and thus Vacuum Dressing was applied to enhance granulation, followed by split thickness skin graft coverage. The study is in accordance with the principles of the Declaration of Helsinki.

Technique

A young patient had an open tibial fracture on middle third of leg (Figure I). His fracture was stabilized with external fixator; wound was debrided and partly skin grafted to reduce surface area of the wound. Vacuum Dressing was applied using sterilized polyurethane foam on the wound and metallic pins to prevent air leak from direct perforation of occlusive dressing. A clear semi-permeable sheet was wrapped around the foam in order to stabilize it and isolate the wound. A Ryle's tube was secured inside the foam for maintaining negative pressure. The wound was finally covered with a big polythene bag by making a hole at its end to take foot out and air tight seal was ensured by applying a semi-occlusive dressing on both ends. Finally the tube was connected to a suction of -125mmHg, the dressing was opened after 72 hours (labeled as one session) and the wound was found to have healthy granulation tissue.

Figure I: Technique of vacuum dressing over lower limb wounds with external fixator device. (A) Post traumatic wound with external fixator. (B) wounds and pins covered with foam (C) Wrapped with clear film sheet in order to support and stabilize foams. (D) Insertion of suction tube and covering whole unit with polythene bag following by minimal tapes at proximal and distal ends. (E) Formation of suction. (F) Granulation in wound after 72 hours of the dressing.

Results

Sixteen patients with open fractures gave consent and were managed with this technique. The mode for age was 38 (range: 19-52), with male predominance. Figure II summarizes the sites of open wounds. Ten (62.5%) patients had 2 sessions of debridement and vacuum dressing was applied after gross debris was clean. Twelve (75%) patients had more than 1 session of

vacuum dressing (mean: 1.6 sessions), however all had common end point of healthy granulation. Nine patients had confounding factors for wound healing; 8 had diabetes, 4 were chronic smokers. All of our patients had secondary wound coverage with split thickness skin graft which had mean 95% take of total wound surface area.

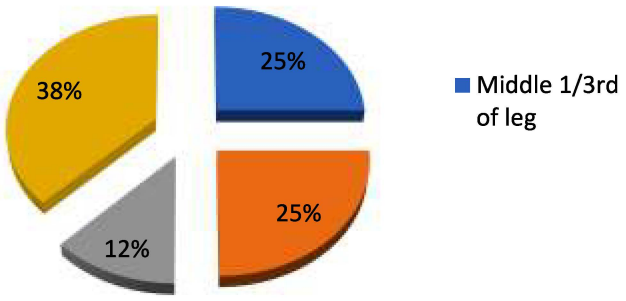

Figure II: Fracture site on lower limb (N= 16)

Discussion

Despite increase in popularity and success rates of free tissue transfers, vacuum dressing has not lost its importance in field of wound management. Many surgeons still rely on Vacuum dressings as it is cost effective and does not require microvascular skills. Surgeons have experimented different techniques of vacuum dressing therapy dressings for wounds with linear and circular external fixators[7]. Those that succeeded in formation of vacuum, showed significant improvement in wounds leading to split thickness skin grafting rather than a complicated flap. Our technique is relatively simpler, time saving and cost effective way of vacuum dressing dressings that can easily be applied on bed side. Along with these advantages, it is far easier to remove this type of dressing as all components easily come off due to minimum use of adhesive tapes.

Vacuum assisted closure is a great tool in the era of reconstructive surgery. It has kept lot of open fracture wounds away from infection and saved lot of limbs from getting amputated. It has also worked nicely on lymphedema and wounds after skin grafting. External fixation devices has always put up serious fight with this particular type of dressing as it often hinders in formation/ maintenance of negative pressure. Different authors have described different techniques for vacuum dressing dressings in such difficult areas but we believe that our technique is simpler and cost effective with promising results. Because of its simplicity it is far easier to be managed on bedside for removal or change of dressing.

Conclusion

We highlight an easy and effective fortification of vacuum dressing, especially when metal frames open wounds. It works just like a traditional vacuum dressing system and is significantly cost effective.

Conflict of Interest

The authors declare that there are no conflicts of interest

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