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Management of Lower Limb Wounds By Negative Pressure Dressings

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ABSTRACT

Objective — *To determine the outcome of home-made negative pressure dressings in acute complex wounds of the lower extremity in terms of healing.*

Study design — *Descriptive case study.*

Place & Duration of study — *Department of Orthopaedics & Spine Surgery, Ghurki Trust Teaching Hospital Lahore, from September 2012 to February 2013.*

Methodology — *Patients with soft tissue defects of lower extremity were included. Preoperative size of the wound with Gustilo type IIIA and IIIB was measured and negative pressure dressings were applied. Each dressing was applied for 72 hours. Outcome of the wound was assessed on 9th day after 3 dressings. The quality of granulation tissue and wound healing were noted.*

Results — *A total of 100 patients were enrolled. There were 75 males and 25 females with a ratio of 3:1. Mean age was 32.88±6.10 year. Seventy percent patients had decrease in size of the wound. Ninety patients developed granulation tissues in the lower limb wounds.*

Conclusion — *Home-made negative pressure dressing was a valuable therapy in the management of acute injuries of lower limb as it resulted in granulation and healing of the wound under challenging conditions.*

Key words — *Lower limb, Negative pressure dressing, Granulation, Wound.*

INTRODUCTION:

Open lower limb orthopaedic injuries cause significant burden on healthcare resources with morbidity.[1] These injuries are usually caused by road traffic accident. Lower limb wounds have some unique features that affect the management. Relatively poor blood supply and local tissue characteristics, cause difficulties in wound healing.[2] Reconstruction of soft tissue defect of leg is difficult to achieve in such cases. It is a challenging condition as most of these wounds have exposed bones, tendons or vital structures. Salvaging severely traumatized limbs can be quite difficult as options are limited.

Available reconstruction procedures include skin graft, local and distant flaps. Due to increase operative time and non availability of microsurgical skills, these procedures are not performed in acute injuries of limb.[3] A wound care technique that has a proven role in lower limb wound management is the use of sub-atmospheric pressure to promote the healing of wounds that are initially difficult to manage by primary closure and other reconstructive procedures. This technique results in efficient cleaning of the wound, decrease bacterial load and granulation tissue promotion of the wound.[4,5]

Vacuum assisted closure (VAC) dressing results in

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88% of wounds to granulate and reduction in wound size is reported in 68.1% patients.[6] There are various commercially available kits of VAC dressing but are expensive. Home-made dressings are simple alternative of these dressing with similar results.[7,8] Based on sub-atmospheric wound healing, a simple alternative is developed in our hospital to provide controlled negative pressure environment for wound healing of lower limbs. This study was conducted to document the results of VAC in orthopaedic patients with bone fractures categorized as Gustilo type IIIA and IIIB injuries.

METHODOLOGY:

This descriptive case series was conducted in the Department of Orthopaedics and Spine Surgery, Ghurki Trust Teaching Hospital Lahore, from September 2012 to February 2013. The sample size calculated was 100 and patients were selected through non-probability purposive sampling technique. Patients of either sex and all age groups, with Gustilo Type IIIA and IIIB injuries, were included. Patients with severally mangled limbs, wound with exposed major vessels, necrosed skin, diabetic mellitus and anemia with hemoglobin <8gm/dl, were excluded. An informed consent was taken. The demographic information like name, age, sex, address etc was recorded.

Preoperative size of the wound with Gustilo type IIIA and IIIB was measured and negative pressure dressing applied. Each dressing was applied for 72 hours. Outcome of the wound was assessed on 9th day, after three dressings. Data was entered into SPSS version 10. The socio-demographic variables were presented as mean and standard deviation for numerical data and qualitative variables like decrease in size of the wound and granulation tissue in percentages.

RESULTS:

One hundred patients of lower limb wounds were included in this study. There were 75 males (75%) and 25 females (25%). Male to female ratio was 3:1.There were 50 patients (50%) in age group 20-30 years, 30 (30%) between 31-40 year and 20 (20%) in age group of 41-50 year. The mean age was 32.88±6.10 year. Seventy (70%) patients had decrease in size of the wound. In 90 patients good granulation tissue was noted.

DISCUSSION:

Negative pressure wound therapy promotes wound healing by applying a vacuum through a special sealed dressing. The intermittent vacuum draws out fluid from the wound and increase blood flow to the area.[9] Typically, the dressing is changed two times per week.[10] The dressings used for this technique include open-gel foam dressings, sealed with an occlusive dressing, intended to contain the vacuum at the wound site.[11] Fluids, such as saline, are used to irrigate the wound.[12] Intermittent removal of the used fluid supports the cleaning and drainage of the wound bed. [13]

Lower limb wounds have relatively poor blood supply. Tight tissue compartments poses further difficulties in wound management. The use of home-made negative pressure dressings have an established role in wound healing.[14] Two main factors considered to be responsible for the wound healing and decrease in size, removal of fluid and mechanical deformation.[15] Removal of fluid decreases edema, which decreases the interstitial pressure resulting in increased blood flow. Mechanical deformation causes a wide variety of molecular responses, including changes in ion concentration, permeability of cell membrane, release of second messengers, and stimulation of molecular pathways thus increasing the mitotic rate of stretched cells. Labler et al found increased concentration of local interleukin-8 and vascular endothelial growth factor, which may accelerate neovascularization.[16] This therapy has now been used successfully to treat chronic and acute wounds of lower limbs.[17] In the present study, 70% wounds reduced in size and 90% wounds showed good granulation tissue demonstrating effectiveness of this therapy. The results of our study are comparable to national and international literature.

CONCLUSIONS:

Negative pressure dressing therapy promoted healing and the formation of healthy granulation tissue. It was effective in promoting granulation tissue on bones devoid of any periosteum and tendons without any paratenon.

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Shahzad Javed: Supervision
Amer Aziz: Critical review.

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