COMPARISON OF CONVENTIONAL GAUZE THERAPY WITH VACUUM ASSISTED CLOSURE WOUND THERAPY IN ACUTE TRAUMATIC WOUNDS

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ABSTRACT

Objective: To compare the Vacuum Assisted Closure (VAC) wound therapy with Conventional Gauze Therapy (CGT) in management of acute traumatic wounds on the basis of time taken to achieve a vital red wound ready for definitive surgical closure.

Study Design: Randomized control trial.

Place and Duration of Study: Department of Surgery Combined Military Hospital Rawalpindi from Mar 2009 to Sep 2009.

Patients and Methods: This study included 82 patients of acute traumatic wounds. Patients were randomly allotted to group A, in which wound was treated with new method of vacuum assisted closure (VAC) wound therapy and to group B, in which wound was managed by conventional gauze therapy (CGT). Outcomes were measured by the presence of vital red wound ready to be closed by surgical intervention. Patients with concomitant systemic pathology were not included in study.

Results: Comparison between the two groups revealed mean time for wound healing 13 days in group A and 16.9 days in group B with significant difference (*p* value =0.029).

Conclusion: Vacuum assisted closure wound therapy is an effective method in reducing time of wound healing for definitive surgical closure.

Keywords: Vacuum Assisted Closure (VAC) wound therapy, Acute traumatic wound, Conventional gauze therapy.

INTRODUCTION

Since the beginning of history, mankind has suffered traumatic injuries including falls, burns, drowning, during interpersonal conflict and wars. While the mechanisms of injury and incident rates for specific wounds may have changed over the millennia, trauma remains the global public health problem and the dominant cause of morbidity and mortality. The incidence of traumatic wounds is rising proportionately to the degree of industrialization. In Pakistan, traumatic wounds are on rise due to the prevailing conditions of terrorism, street violence and road traffic accidents.

Traumatic wounds are diverse in relation to wound type, location, size and complexity. The nature of injury can predict that it may not be feasible and possible to bring the skin edges together either due to extensive tissue loss, the presence of devitalized tissue, the potential risk of infection, damage to the underlying structures following an avulsion injury or high velocity injuries like gunshot wound or splinter injuries[1]. The principle of managing traumatic wounds is to surgically debride any devitalised tissue, wound lavage and lay the wound open if infection is suspected. Regular change of dressing and debridement are then followed till the wound is healthy. The ideal intrinsic wound healing environment is moist, infection free with a good blood supply, and contains the correct balance of inflammatory mediators[2]. Dressings range from traditional gauze dressing to more complex medically impregnated dressings e.g. alginate, hydrocolloid, hydrogels which are specific for wound types. Normal saline surgical gauze dressing provide moist, warm and sterile environment for wound healing. Regular

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dressings are changed till the formation of granulation tissue i.e pink wound without pus discharge. Degree of wound healing directly depends on debridement and frequency of change of dressing.

The concept of negative suction drains and continuous low pressure suction drains prevail in surgical department since long but Vacuum Assisted Closure (VAC also called vacuum therapy, vacuum sealing or topical negative pressure therapy, negative pressure wound therapy) is a new, relatively simple and sophisticated development of a standard surgical procedure[3]. A piece of foam is introduced into the wound bed and a drain with lateral perforations is laid on top of it or between the layers of foam. The entire area is then covered with a transparent adhesive membrane (opsite), which is firmly secured to the healthy skin around the wound margin. The other end of the drain tube is connected to a vacuum source from which the fluid is drawn out of the wound via foam into a reservoir for subsequent disposal. The plastic membrane prevents the ingress of air and allows a partial vacuum to form within the wound, reducing its volume and facilitating the removal of fluid. The foam ensures that the entire surface area of the wound is uniformly exposed to this negative pressure and prevents the occlusion of perforations in the drain, if in direct contact with the base or edges of the wound[4]. VAC causes increase in granulation tissue[5], decrease in bacterial colonization of wound[6,7], removes large amounts of fluid from wounds especially acute burns[4,7] and increase in local wound blood flow[9].

The objective of this study was to compare the VAC therapy with Conventional Gauze Therapy, in management of acute traumatic wounds on basis of time taken to achieve a vital red wound ready for definitive surgical closure.

PATIENTS AND METHODS

This comparative study was carried out at the Department of Surgery, Combined Military Hospital Rawalpindi from 28th Mar, 2009 to 28th Sep, 2009. Eighty two patients were recruited during six months study period. All the patients with age group between 10 years to 60 years having acute traumatic wounds secondary to gunshot wound, accidents and penetrating injuries having 3-15 cm length and less than 3 cm depth were included in the study. Patients having diabetes mellitus, peripheral arterial disease, vasculitis, osteomyelitis, fistulas, eschars, malignancy, wounds with exposed vascular bundles, immunocompromised and high exudates were excluded from the study. All the patients fitting in inclusion criteria were recruited and randomized by lottery method into two equal groups using single blind technique. Detailed history was taken and examination done. Informed written consent from each patient was taken, necessary investigations i.e, full blood count and required X rays were carried.

Group A was treated by new method of VAC wound therapy. Where 7-10 mm thick foam was sterilized in autoclave, prior to use, and kept in a separate sterilized drum. Wounds fitting in inclusion criteria were debrided till healthy tissue. Foam was folded to make two layers and cut according to shape of wound to fit in the wound cavity. Drain with lateral pores was placed between the layers of foam. Transparent film (opsite) was placed to seal the wound and make it air tight. The other end of drain was attached with the suction machine and intermittent suction started with 45 minutes continuous suction and 15 minutes off with negative pressure of 50-170 mm Hg. Dressing was changed every third day.

Group B was treated by conventional gauze dressings (CGT). Surgical gauze was first sterilized and then made moist to wet by normal saline and covered by sterile simple bandage. Dressings were changed daily on basis of amount of exudate. Most of the wounds were of extremities n=69 caused by gunshot wounds and road traffic accidents. Others included crush injuries n=5, degloving injuries n=4, avulsed injuries n=2 and surgically incised wound n=2 (Fig 1). Commonest location of wound was lower limb 58.5% n=48 followed by upper limb 32.9%

n=27, abdomen 4.8% n=4 and chest 3.6% n=3 (Fig 2). Wounds which were positive for culture and high exudate were not included in study. Both groups were given injectable antibiotic i.e amoxicillin + clavulanic acid (Augmentin) according to weight. In both study groups time was calculated for preparation of vital red wound i.e. wound containing healthy pink to red granulating tissue without any pus, slough or necrotic tissue with naked eye and ready for definite surgical management by graft, flap or secondary closure.

RESULTS

Out of 82 patients recruited in the study 70 (85.4%) were males and 12 (14.6%) were females. Group-A included 34 (82.9%) males and 7 (17.1%) females and in Group-B there were 36 (87.8%) males and 5 (12.2%) females. The age of patients varied from 11 to 58 years. Mean age was 28.8 ± 8.8 years in group A and 29.8 ± 9.5 years in group B. There was no significant statistical difference between the grouped variables (p= 0.08). In group A mean time taken by wound to heal was 13.0 ± 7.2 days and range being 4-36 days. Whereas in group B mean time to heal was 16.9 ± 8.3 days and range being 5-38 days (p =0.029).

DISCUSSION

Traumatic wounds are emerging as the most challenging wounds to handle starting from simple abrasion to badly crushed and contaminated wounds with dirt, soil and foreign bodies. They need thorough debridement, tetanus prophylaxis, daily dressing changes and are closed as early as possible. In addition to dressings newer techniques are now emerging in field of wound management to enhance wound healing and decrease time to close wounds. One such technique is vacuum assisted closure also called negative pressure wound therapy which has made breakthrough in management of acute and complex wounds. It was described and published by Argenta and Morykwas in 1997[10]. They identified 300 wounded patients who presented with chronic wounds, subacute wounds (wounds that had been open <7 days),

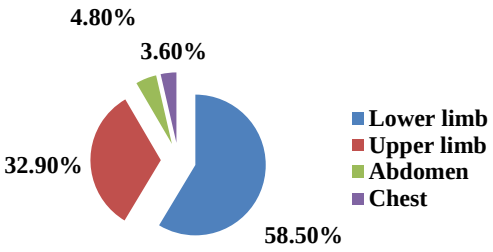

Figure-1: Distribution of traumatic wounds by site (n=82).

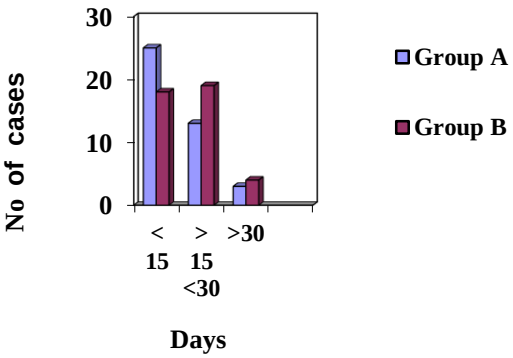

Figure-2: Healing time of wound in each group.

and acute wounds (wounds that had been open <12 hours). All patients were treated with negative pressure till the wounds were completely healed and ready to be closed by a surgical procedure.

In our study, mean time to healing for definitive closure in VAC group was 13.07 days. While the average time in the first reported study in Pakistan was 16.7 days[11]. Literature shows variable results of time taken by wounds to heal, ranging from 6.7- 38.9 days[12-15]. The difference in time is due to different types of wounds selected in these studies. In two other studies, average time healing was shorter than our study because of clean incised fasciotomy wounds for

compartment syndrome as compared to dirty high velocity wounds in our setup[12,15]. In another study mean time for definitive closure was 38.9 days which was greater than our study, due to dissection on inguinal lymph nodes in penile malignancy causing high exudates and delayed healing in malignancy[13]. In another randomized trial, mean healing time was 16 days which was near to our study[14]. In further two studies satisfactory healing was achieved in 22.8 days and 21 days while dealing with diabetic foot and complex wounds respectively[16,17].

In group B wounds treated with moist conventional gauze therapy mean time to heal was 16.93 days in our study. However in other studies stated above it ranged from 16.1-69[8]. days[12-17]. Wounds which took more time in healing for definitive surgical closure were either chronic[17], with high exudate and malignancy or complex wounds[16].

While comparing the results of our study with studies in literature we found significant difference in mean time required by wound for definitive surgical closure ($p < .05$) in all studies. It was .001, .013, <.05 in respective studies[13-15]. Wounds treated with VAC therapy took less time to heal, with rapid granulation tissue and less signs of inflammation. There was shorter duration of hospital stay, early recovery, less discomfort for patient, less demanding for health workers and early return to active life in correlation with the literature.

Limitation of this study is that majority of the wounds were war injuries with high velocity penetrating injuries causing more damage and contamination as compared to accident and violence wounds which were less contaminated. Secondly time of reaching in our setup in most of the war wounds was more than 12 hours due to travelling time enroute with only initial wound management by hemostasis maintenance and splinting at periphery which may have caused delay in wound healing in many wounds. Thirdly our setup runs military oriented wounds mainly and may not be true representation of traumatic wounds in general population. Some of the patients were dropped from study as they developed high exudate from wound and shifted to alginate dressings.

CONCLUSION

VAC therapy is a sophisticated technique and helps in enhancing wound healing by providing almost ideal environment to wound. It is definitely superior to conventional gauze therapy in treating acute traumatic wounds. However further comparative studies among medically impregnated, VAC therapy and modern dressing with large sample size are recommended in order to prove its efficacy in other wound types.

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