



CODEN [USA]: IAJPBB

ISSN : 2349-7750

**INDO AMERICAN JOURNAL OF  
PHARMACEUTICAL SCIENCES**

SJIF Impact Factor: 7.187

<http://doi.org/10.5281/zenodo.4326351>Available online at: <http://www.iajps.com>

Research Article

**COMPARISON OF CONVENTIONAL DRESSING OF WOUND  
AND NEGATIVE PRESSURE WOUND THERAPY IN OPEN-  
FRACTURES WOUNDS**<sup>1</sup>Dr Khansa Sana Chaudhary, <sup>2</sup>Dr Zain Akbar<sup>1</sup>Sharif Medical City Hospital, Lahore<sup>2</sup>Latin American School of Medicine Cuba**Article Received:** October 2020      **Accepted:** November 2020      **Published:** December 2020**Abstract:**

**Objective:** The primary step in the treatment of the successful closure is the open-fractures wounds. Late/Delayed recovery or high rate of complications can cause the increase in the duration of treatment, rates of disability and costs. The purpose of this research work was to provide the comparison of the conventional dressing of wounds and negative pressure wound therapy in the patients having open-fracture wounds.

**Methodology:** This is a prospective randomized research work in which 90 patients present with the open-fractures who got referrals for therapy, underwent study. The duration of this study was from June 2018 to August 2020. We divided the patients into 2 groups. The patients of Group-1 underwent treatment through negative pressure wound therapy and the patients of Group-2 underwent conventional dressing of wounds. We followed up the patients for complete one month. In this month of follow up, the amount of the dressing change was varying depending upon the extent of the wound in the patients. Duration of the healing of wound, the availability of the infection and amount of the days in hospitalization in all these patients were also recorded and we compared these parameters in the end of this research work between the patients of both groups. The check lists and questionnaires were utilized for the collection of data. We used the SPSS V.22 for the statistical analysis of the collected information. P value of less than 0.050 was considered as statistically significant.

**Results:** We found difference between the rates of wound recovery in the patients of Group-1 and patients of Group-2 ( $P < 0.050$ ). We found no significant difference between the patients of both groups in the prevalence of the infection ( $P = 0.60$ ).

**Conclusion:** Utilizing the negative pressure wound therapy expedites the process of healing of the extremity wounds. It is highly economical and it can be considered as a proper substitute for the therapy of the open-fracture wounds.

**Keywords:** Open-Fractures Wounds, Infection, Hematoma.

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Please cite this article in press Khansa Sana Chaudhary et al, *Comparison Of Conventional Dressing Of Wound And Negative Pressure Wound Therapy In Open-Fractures Wounds.*, Indo Am. J. P. Sci, 2020; 07(12).

**INTRODUCTION:**

When wound combines the fracture hematoma, it is known as open-fracture. The high energy trauma is the result of open-fracture. Prevention from infection and management of wound is the main basic step in the therapy of the open-fractures. Timely and proper treatment of open-fractures is very important as open-fractures has association with the high infection risk and associated complications in the duration of treatment [1]. Gustilo-Anderson system of classification is used for the classification of open-fractures [2]. Infections of open-fractures are generally acknowledged to be between 0 to 2% in Type-1, 2% to 10% in Type-2 and 10% to 50% in Type-3. The duration of the antibiotic treatment and time for wound remodeling are not directly accountable for the infection [3]. In NPWT therapy, there is use of the foam or gauze for the advancement in the healing of wounds [4]. Brand name of VAC is most common utilized for the negative pressure wound therapy [5].

Argenta & Morykwas introduced this new technology twenty years ago for clinical treatment [6]. In this method, negative pressure exerts a biological impact that subsequently causes the improvement in healing. Treatment of the complex wounds is very difficult [7]. negative pressure wound therapy was initially detected as the adjunctive treatment to support the healing of the complex open wounds and various previous research works have cited the high rate of success of this method [8]. Drawing of the edges of wounds together [9], stabilization of surroundings of wound; increases the healing of wound with complete closure of wound in preparing it for skin graft [10]. After three to four years of treatment, there is drop in the bacterial counts [11]. Employment of dressings with negative pressure or suction has positive impact on the treatment of open-fractures and reduction in the rates of complications [12]. This research work aimed to assess the impact of negative pressure wound therapy dressing on wounds of open-fractures as compared to the conventional dressing of wounds.

**METHODOLOGY:**

Ethical committee of the institute University of Medical Sciences located in Jundishapur Ahvaz, gave the approval for the conduction of this research work. We took the written consent from all the patients of this research work after describing them the purpose

of this research work before the start of this research work. Out of 136 patients having open-fracture were reviewed and forty-six patients among them got exclusion from this research work and 90 remaining patients got recruitment. We divided all the patients into 32 groups. The patients of Group-1 underwent method of negative pressure wound therapy and patients of Group-2 underwent the conventional dressing of wounds. VAC (Vacuum Assisted Closure) device is a machine used for the production of the negative pressure. After a complete debridement of open-fractures and getting a neat wound skin and loss of soft tissue, we placed the sponge foam on wound. Then, we covered the wound with the help of adhesive drape. Finally, we inserted the inner end of a suction-tube in wound and connected the outer end with the device. We changed the wound dressings usually after every forty-eight hours and negative pressure continued for ten to fourteen days. The patients of control group underwent conventional dressings.

We only included the patients from 15 to 55 years of age present with open-fractures wounds of type 3B on the basis of classification of Gustilo-Anderson categorization. All these patients were present with accessible clean wounds. We separated the age and gender matched patients into two groups. We followed up all the patients for complete one month. We advised the patients to visit hospital for routine checkups after discharge and we followed up all the patients throughout the complete research work. We inspected the wounds on weekly basis for the availability of granulation tissues, redness in wound bed, reduction in wound drainage and reduction in wound's dimensions. We defined the wound infection as the purulent discharge from the site of wound or the positive culture present on wounds. We used well-organized questionnaire for the collection of the data and its statistical analysis carried out with the utilization of the SPSS V20. We considered the P value of 0.050 as significant.

**RESULTS:**

In this research work, 90 patients got recruitment in this research work, and we divided the patients in 2 separate group. These patients included 22.40% (n: 22) female patients and 75.60% (n: 68) male patients who were randomly assigned to both groups of treatment (Table-1).

**Table-I: Distribution Kind of Bone Fractures Based on Treatment Methods**

Treatment Method	Tibia & Fibula	Femur	Humerus	Radius & Ulna	Total
Group I (NWPT)	30	10	2	3	45
Group II (Conventional Dressing)	30	10	3	2	45

The average age of the patients was  $31.86 \pm 9.70$  years. The range of the age of the patients was from 16 to 53 years. Age distribution in the patients of both groups was approximately simple and the difference was not significant ( $P=0.70$ ). We found no significant difference between the patients of both groups regarding data about demography (gender, height, age, weight) ( $P=0.0710$ ). We used the Gustilo-Anderson system of classification for the assessment of the type of classification. There was similar pattern of types of fractures, method of fixation, site and wound size in the patients of both groups.

At the end of this research work, we evaluated the both groups for the rate of infection. In Group-1, we found infection in three patients with a patient having deep infection and in Group-2; we observed infection in four patients with one patient having deep infection. There was not much significant difference in the patients of both groups regarding infection rate according to Chi square method ( $P=0.60$ ). The average duration of stay in hospital for the preparation of wound coverage by flap or skin graft was  $10.50 \pm 2.80$  days for all recruited patients which was  $9.70 \pm 2.30$  &  $11.20 \pm 3.10$  for the patients of Group-1 and Group-2 respectively. There was a significant difference in the patients of both groups about the decrease in the stay at hospital. T test showed the stay at hospital for the patients of Group-1 was much less as compared to the patients of Group-2 ( $P=0.010$ ). The reduction in the wound surface was 19.0% in the patients of Group-1 and 6.0% for the patients of Group-2. The findings of paired T-test showed the important difference in the surface of prior and post-treatment in patients of Group-1 ( $P=0.0010$ ). Independent T-test stated the significant disparity between the patients of Group-1 and Group-2 regarding the reduction in the wound surface ( $P=0.0110$ ). 15 patients in Group-2 and 5 patients in group-1 required skin graft.

### DISCUSSION:

Negative pressure wound therapy is a procedure of the management of dressing for the soft tissues of high grade open-fractures [13]. This procedure increases the production of collagen and protein and mitigates the colonization of bacteria. Consequently,

this method is effective for the treatment of the chronic and acute wounds. We found a significant difference in surface area of wound prior and post treatment in the patients of Group-1 and Group-2 regarding reduction of wound surface. Open-fractures are much susceptible to acquire infection; however, there is rare infection in closed-fractures [14]. The development of infection rate in open-fractures depends on different types of fractures, intervention's type, antibiotic treatment and condition of the patients. In types of 3B and 3C open-fracture, external fixation is used for the stabilization of bone and Dedmond stated that rate of infection was 12.50% for type 3A open-fractures, 45.80% for type 3B and 50.0% for type 3C [15].

Some studies stated that this particular method may be advantageous in the reduction of the requirement for transfer of free tissue or flap coverage of rotational muscle. Blum discovered that utilization of negative pressure wound therapy could decrease the risk for the development of the deep infection of about 80.0% [16,17]. There is some research work which showed that age is a significant factor in the healing of wound and they believed that with the increase in the age, there is decline in the sensorineural function which plays very significant role in the reconstruction of the tissues.

### CONCLUSION:

The results of this research work were similar to many other research works conducted in past about the methods of negative pressure wound therapy on the expedition of the rate of wound recovery. This process is much simple, less expensive and lacks the adverse side effects. The method reduces the days of hospitalization. This procedure reduces the surface of wound and leads to better outcomes.

### REFERENCES:

1. Webster J, Scuffham P, Stankiewicz M, Chaboyer W P. Negative pressure wound therapy for skin grafts and surgical wounds healing by primary intention. The Cochrane Library (2014). doi:10.1002/14651858.CD009261. pub3.
2. Ulusal AE, Sahin MS, Ulusal B, Cakmak G, Tuncay C. Negative pressure wound therapy in

- patients with diabetic foot. *Acta Orthop Traumatol Turc.* 2011;45(4): 254-260.
3. Yusuf E, Jordan X, Clauss M, Borens O, Mäder M, Trampuz A. High bacterial load in negative pressure wound therapy (NPWT) foams used in the treatment of chronic wounds. *Wound Repair Regen.* 2013;21(5):677-681. doi: 10.1111/wrr.12088.
  4. Gregor S, Maegele M, Sauerland S, Krahn JF, Peinemann F, Lange S. Negative pressure wound therapy a vacuum of evidence? *Arch Surg.* 2008;143(2):189-196. doi:10.1001/archsurg.2007.54.
  5. Penny HL, Spinazzola J, Green A, Rifkah M, Faretta M, Youshaw D, et al. Negative pressure wound therapy with Bio-Dome dressing technology in the treatment of complex wounds: A case series. *J Wound Care.* 2014;23(Suppl 4): S4- S9. doi: 10.12968/jowc.2014.23.Sup4.S4
  6. Stannard JP, Gabriel A, Lehner B. Use of negative pressure wound therapy over clean, closed surgical incisions. *Int Wound J.* 2012;9(Suppl 1):32-39. doi: 10.1111/j.1742-481X.2012.01017.x.
  7. Ousey KJ, Atkinson RA, Williamson JB, Lui, S. Negative pressure wound therapy (NPWT) for spinal wounds: a systematic review. *Spine J.* 2013;13(10):1393-1405. doi: 10.1016/j.spinee.2013.06.040.
  8. Dumville JC, Munson C. Negative pressure wound therapy for partial-thickness burns. *Cochrane Database Syst Rev.* 2012;12. doi: 10.1002/14651858.CD006215.pub4
  9. Dumville JC, Hinchliffe RJ, Cullum N, Game F, Stubbs N, Sweeting M, et al. Negative pressure wound therapy for treating foot wounds in people with diabetes mellitus. *The Cochrane Library* (2013). doi: 10.1002/14651858.CD010318.pub2.
  10. Orgill DP, Bayer LR. Negative pressure wound therapy: past, present and future. *Int Wound J.* 2013;10(Suppl 1):15- 19. doi: 10.1111/iwj.12170.
  11. Hannigan GD, Pulos N, Grice EA, Mehta S. Current Concepts and Ongoing Research in the Prevention and Treatment of Open Fracture Infections. *Adv Wound Care.* 2015;4(1):59-74. doi: 10.1089/wound.2014.0531.
  12. Adkins CL. Wound care dressings and choices for care of wounds in the home. *Home Healthcare Now.* 2013;31(5):259- 267. doi: 10.1097/NHH.0b013e31828eb658.
  13. Joethy J, Sebastin SJ, Chong AK, Peng YP, Puhaindran ME. Effect of negative-pressure wound therapy on open fractures of the lower limb. *Singapore Med J.* 2013;54(11):620-623. doi:10.11622/smedj.2013221.
  14. Arti HR. Comparison of early versus delayed debridement in open fractures. *Pak J Med Sci.* 2012;28(5):856-859.
  15. Liu D SH, Sofiadellis F, Ashton M, MacGill K, Webb A. Early soft tissue coverage and negative pressure wound therapy optimises patient outcomes in lower limb trauma. *Injury.* 2012;43(6):772-778. doi: 10.1016/j.injury.2011.09.003.
  16. Vaienti L, Gazzola R, Benanti E, Leone F, Marchesi A, Parodi PC, et al. Failure by congestion of pedicled and free flaps for reconstruction of lower limbs after trauma: the role of negative-pressure wound therapy. *J Orthop Traumatol.* 2013;14(3):213-217. doi:10.1007/s10195-013-0236-0.
  17. Bhattacharyya T, Mehta P, Smith M, Pomahac B. Routine use of wound vacuum-assisted closure doesnot allow coverage delay for open tibia fractures. *Plast Reconstr Surg.* 2008;121(4):1263-1266. doi: 10.1097/01.prs.0000305536.09242.a6.