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Negative Pressure Dressing of Infected Wounds In Neurosurgical Ward At RIMS.A Case Series Study.

Dr Alok Chandra Prakash[(1),] Dr Anand Prakash[(2),]
Dr Chandra Bhushan Sahay[(3).]
1-Senior Resident 2-Associate Professor 3-Professor
Department of Neurosurgery RIMS Ranchi,Jharkhand,India.
Corresponding author: Dr Alok Chandra Prakash

Abstract: *Negative-pressure wound therapy (NPWT) is a therapeutic technique using a vacuum dressing to promote healing in acute or* chronic wounds to evaluate the results and benefits obtained from the topical use of negative pressure wound therapy (NPWT) in patients with infected wounds.
This was a retrospective study of 80 patients (mean age 45 years) with infected wounds treated using NPWT. The infected wounds were caused by trauma. The treatment system used was SIMEX 300 made by Simex medizintechnik Gmbh,Germany. applied to the wounds in continuous mode from 100 to 150 mmHg. The parameters related to the wounds (location, number of VAC changes, the size of the defects in the soft parts, and the evolution of the state of the wound), length of hospital stay, length of intravenous antibiotic therapy, and complications related to the use of this therapy were evaluated.
The mean length of the hospital stay, use of NPWT, and antibacterial therapy were 41 days, 22.5 days, and 20 days respectively. The use of the VAC led to a mean reduction of 29% in the wound area . Only one patient did not show any improvement in the final appearance of the wound with complete eradication of the infection. No complication directly caused by NPWT was observed.
NPWT stimulates infection-free scar tissue formation in a short time, and is a quick and comfortable alternative to conventional infected wounds treatment methods.
Keywords: *Negative-pressure wound therapy, Wound healing, Wounds and injuries, Infection.*

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I. Introduction

NPWT promotes wound healing by applying a vacuum through a special sealed dressing. The continued vacuum draws out fluid from the wound and increases blood flow to the area(1). The vacuum may be applied continuously or intermittently, depending on the type of wound being treated and the clinical objectives. Typically, the dressing is changed two to three times per week(2).The association of infection with loss of soft tissue, one of the most complex complications of extremities surgery, leads to difficult problems, such as exposure of implant hardware and sensitive structures such as tendons, nerves, and bone. Some of the surgical options for this problem described in the literature include rotation flaps, skin grafting, use of colloids, and flap transfers, among others. All these surgical choices are made after debridement of devitalized tissue and copious irrigation of the injured area(3).Treatment is usually long and leads to complications in many cases, the most common being severe pain during dressing changes(4).

One therapeutic option, termed negative pressure wound therapy (NPWT), also known as vacuum assisted closure (VAC) dressing, provides the following benefits: control of drainage of fluids, reduction of local edema, reduction of bacterial load, and early development of granulation tissue by angiogenic stimulation(5,6,7) Initially described by Argenta and Morykwas,(8) this therapy has become an important and effective tool for fighting infection in complex wounds, by acting topically with low complication rate, providing greater comfort to the medical team and patient, as well as reducing time of hospitalization, use of antibiotics, and number of dressing changes.(8,9,10,11)

The purpose of this study was to evaluate the results and benefits brought by the topical application of NPWT in patients with infected wounds.

II. Material And Methods

This study was carried out at Rajendra Institute Of Medical Sciences Ranchi Jharkhand India Between February 2016 to January 2018.During these period a total of 80 Patients with acute and chronic infected wounds were selected for this study of different age groups with mean age of 45 years.

We done Negative Pressure Wound Dressing with the help of a device named SIMEX 300,made at simex Medizintechnik Gmbh Germany.

The following inclusion criteria were adopted: presence of positive culture, use of vacuum drainage for over five days, purulent local drainage, and tissue necrosis. For the present study, a sample composed of 80 patientswas selected and retrospectively assessed by collection of data.

Clinical series: data regarding 80 patients before and after NPWT.

All patients had a minimum follow-up of six months. Mean age was 45 years. Trauma was the main cause of hospitalization, followed by postoperative infection.

Patient victim of motorcycle accident. Presence of fractures,presence of local infection Appearance after 28 days of NPWT therapy. All patients were evaluated together,Clinical and laboratory parameters (local culture, white blood cell count, erythrocyte sedimentation rate, and C-reactive protein) collected weekly, served as the basis of monitoring and guided the use and duration of intravenous antibiotic therapy (discontinued after normality in the aforementioned parameters). In most of the patients the causative agent was found to be *Staphylococcus aureus*. After diagnosis, all patients underwent surgical treatment (debridement and local wound irrigation), followed by local treatment of the injury with NPWT. In this series, SIMEX 300 system was used in all patients, consisting of a suction pipe, a reservoir, a vacuum pump, and a multiporous polyurethane sponge. Under sterile conditions, the sponge was cut to precisely cover the extent of the wound, applied directly on it (covering the entire extension), and sealed with a transparent adhesive and vapor-permeable film. This ensemble was connected to the reservoir through a suction tube, allowing for the control of the volume of secretion suctioned and a negative local pressure in continuous mode, on the order of 100–150 mmHg . The NPWT system was changed every 3–4 days; the first application was in the operating room and the remaining, mostly at bedside. According to patient's clinical development, when necessary, dressing was changed in the operating room after formal debridement. The use of dressing was discontinued after healthy granulation tissue was present. Additional procedures, such as skin grafting and flap rotation, were sometimes required for final coverage. The following wound-related parameters were analyzed: location, amount of debridement, number of VAC exchanges, and size of soft tissue defect before and after the application of the dressing. The comparative evolution of the wound degree at the beginning and end of therapy was assessed, divided into groups based on the degree of exposure and the presence of infection, The duration of hospital-stay and intravenous antibiotic treatment were also recorded, as well as the complications related to the use of therapy,and all the data were analyzed thoroughly.

III. Results

In the present study, the patients remained in the unit for mean 41 days (17–75), but with mean 20 days of intravenous antibiotic therapy (8–42). The median duration of therapy was 22.5 days (5–50); on average, the dressing was changed every 3.4 days. These patients were taken 320 times to the operating room for wound debridement (mean four times per patient). Almost all patients achieved an improvement in the final appearance of the wound site, with infection eradication.The degree of the injury, initially grade 4 in all cases, reduced to grade 2 in75%. In this group, only twenty one patients required an additional procedure for wound closure (skin graft). In the entire group, complex procedures (muscle flaps or skin advance graft) were necessary in only few cases. No complications that could be directly attributed to the use of NPWT, such as deep bleeding or worsening local infection, were observed. Three patients had a mild local itching complaint, which was successfully treated with oral medication, allowing for the maintenance of treatment. A patient who underwent skin grafting on the leg showed scar contracture of the grafted area, which improved after surgical release.

IV. Discussion

The topical use of NPWT has been widely studied in the literature over the past 20 years; the vast majority of clinical trials have shown the effectiveness of this therapy in the treatment of superficial wounds.(11,12,13,14) The benefits of such therapy in severe and complicated wounds with extensive loss of soft tissue associated with local infections have been reported in recent years.(15,16) The localized use of NPWT in infected wounds offers advantages such as wound drainage, angiogenesis stimulation, proteinase excretion, and decreased local and systemic bacterial load.In the present study, the mean time of simex npwt use was 22.5 days and the mean duration of intravenous antibiotic therapy was 20 days, in contrast with data in the literature indicating the use of intravenous antibiotics for six weeks for patients with infected wounds.(17,18) In this treatment period, the NPWT was changed every 3.4 days, providing comfort to the patient and the nursing staff, while maintaining a clean dressing without the need for daily changes. In the present study, healthy infection-free granulation tissue was obtained in 76 patients, as well as a significant decrease in lesion size. These data are similar to those obtained by Gregor et al.,(19) who, in a systematic review to assess the effectiveness and safety of VAC compared to conventional therapies for complex wounds, observed a significant reduction of the lesion area for those treated with VAC, without significant adverse effects. In the present study, there were no major

complications, such as hemorrhage, which is a well-known complication that may reactivate important initial bleeding.

Damiani et al.,(20) in a systematic review, compared VAC and conventional dressings in the treatment of patients with infected wounds after cardiac surgery. In the six studies that evaluated the hospital stay of patients with sternal infection, there was a mean reduction of 7.2 days, with no impact, however, in mortality reduction. The main limitation of the present study, apart from the small sample size, was the lack of control group, which did not allow for a direct comparison of patients treated in the same center who underwent conventional method or NPWT. The authors believe that NPWT may be performed through conventional and low-cost methods (through the vacuum system), as described in the study by Ollat et al.(21) Their results are similar to those observed in the present study; nonetheless, those authors reported drawbacks such as the impossibility of an accurate control of the pressure applied to the wound, impossibility of alternating the application of pressure, and the need to change the dressing every 2–3 days to avoid problems such as sponge obstruction by wound secretions.

V. Conclusion

The present findings add to the growing evidence of the benefits of NPWT as an adjunct therapy in the treatment of infected and complex wounds, especially for facilitating the formation of a local infection-free healing tissue in a short period of time, which reduces the need for complex surgical procedures for the final coverage of important structures. Hence, it is a fast and comfortable alternative to conventional methods in the treatment of infected wounds.

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