Original Article

NEGATIVE PRESSURE WOUND THERAPY VERSUS CONVENTIONAL DRESSING IN MANAGEMENT OF NECROTIZING SOFT TISSUE INFECTIONS- A COMPARATIVE STUDY

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DOI: 10.47750/pnr.2022.13.S01.275

Abstract

Active diagnosis and timely management is required in case of necrotising soft tissue infection. Negative pressure wound therapy (NPWT) is used in healing wounds as an adjunct method.

Aim and objective: To validate advantages and efficiency of negative pressure wound therapy (NPWT) over povidone iodine dressing (PID) in treatment of the raw wound due to debridement of necrosed tissue.

Methodology: Patients who had necrotizing soft tissue infections with necrosed tissues, for whom wound debridement was done. Prospective study for wound healing was done and was divided Weekly comparisons were done based on wound cultures, appearance of granulation tissue, by the reduction in surface area was measured using grid tracing method, and by seven weeks the patients were followed for closure of the raw area either by secondary intention or fit for Split skin grafting (STSG).

Results: By the second week there was decrease of wound infections in 55% in NPWT group and 35% in CPID group with P=0.005 Just granulation tissue appeared in 75% of the NPWT group and only 35% in the CPID group with P=0.002 The average wound contraction was by 31% in NPWT group and 11% in CPID group with P=0.000. 85% wounds in NPWT completely healed in the NPWT group and only 55% in the CPID Group with P=0.005

Conclusion: Negative pressure therapy (NPWT) has shown significantly better results in our study.

Introduction

Prompt diagnosis and timely management of Necrotizing skin and soft tissue infections, can prevent life threatening complications. Local injury is responsible for initial entry of pathogen, co morbidity increases the risk and progresses to systemic infection.

The characteristics of infection is based on etiological agent, depth, location. Based on the character prompt surgical intervention involving wound debridement, which leads to a raw area, requiring a further management. Negative pressure therapy (NPWT)helps in would healing efficiently and now accepted as an adjunct method.

Aim & objectives

To validate advantages and efficiency of negative pressure wound therapy (NPWT) over povidone iodine dressing (PID) in treatment of the raw wound due to debridement of necrosed tissue. Objectives based on time of wound healing, prevention of infection, length of hospital stay, active mobilisation, pain, discharge.

METHODOLOGY

The following study was conducted in Meenakshi Medical College & Hospital Research Institute, Kanchipuram

It is a prospective study, with the source of the study being patients admitted with necrotizing fasciitis undergoing surgical debridement.

The period of study was 15 months (Feb 2021 – June 2022).

Ethical clearance was obtained. Inclusion and exclusion criteria were made, only those patients satisfying both those criteria were included in the study.

Sample size of 50 patients, using convenient sampling. 25 patients group I were taken as the study as group for the negative pressure wound therapy (NPWT) another 25 patients group ii were taken as control to whom conventional povidone iodine dressing (CPID) was done.

Inclusion criteria:

Patients above 14 years of age.

lower limb Raw areas Post debridement due to NSTI

Wound size <18% TBSA

Patients giving consent for negative pressure vacuum therapy

Exclusion criteria:

Wounds due to causes other than NSTI

Wounds affecting structures deeper than Fascia

Malignancy

Chronic Diabetic Foots/ PVD

burns wound

Materials Used:

Moist dressings

Sterile Sponge, Sterile Tubing

Mobile Vacuum suction machine

Transparent adhesive plastic sheet

All routine investigations were done including hematological, radiological investigations. Patients' general condition was improved by nutrition supplements, including multivitamins.

Vacuum Assisted Therapy - Procedure

Culture swab was taken prior to wound preparation, after which necrotic dead devitalised tissues were removed surgical wound debridement was done. After achieving hemostasis, the wound is made dry, an open pore foam is placed over the wound site, adhesive drapes were extended upto 3-5cm of normal tissue, which ensures tight sealing.(Figures 2 and 3).

Around -125mmHg of negative pressure is continuously applied to wound.

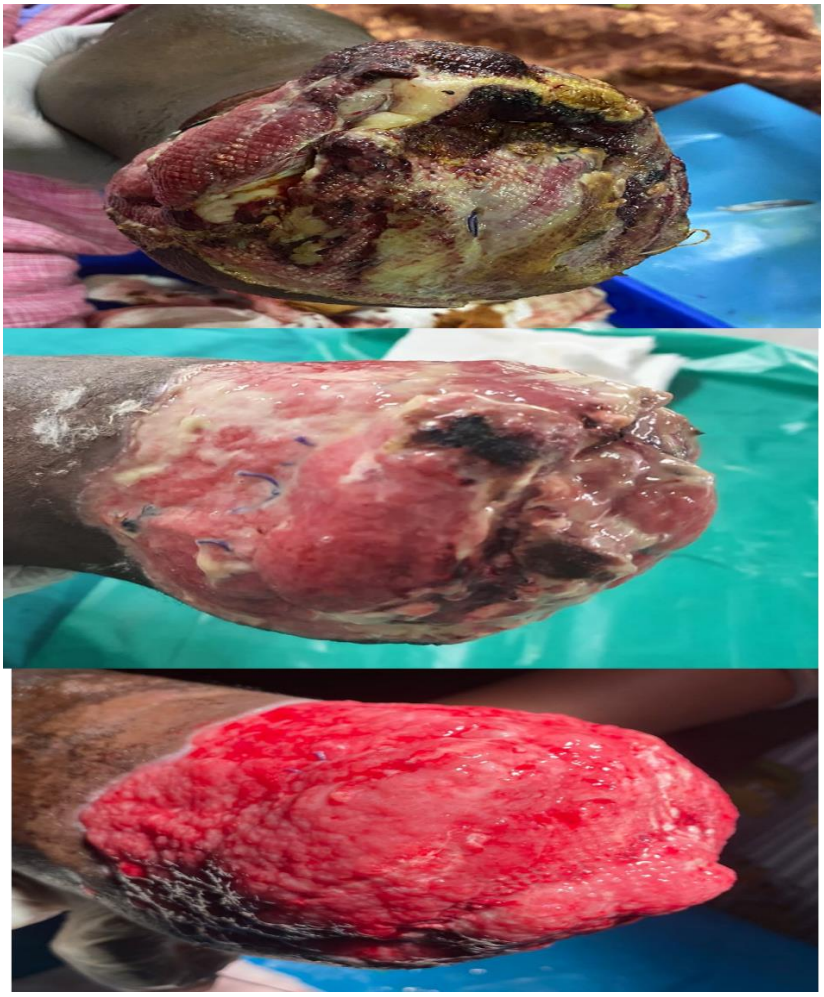


Fig 1.1

Fig 1.2

The above image (fig 1.1 and 1.2) shows the wound post debridement and the healing of wound by reduction in size and growth of granulation tissue post NPWT.

The below table 2, shows organism recovered from wound culture.

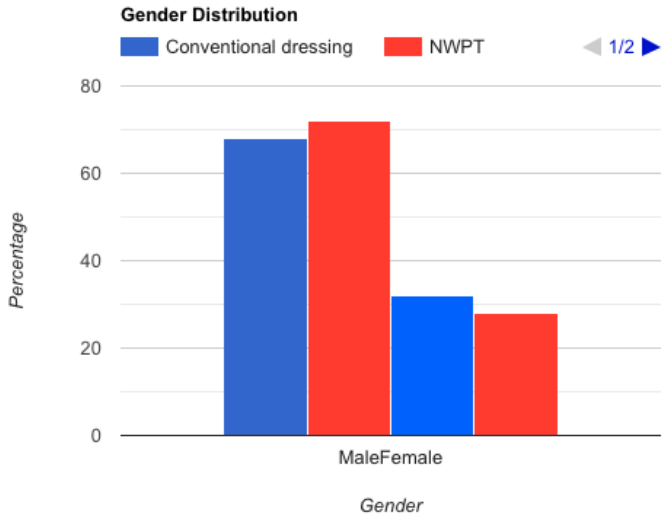
Organism	Group 1 (NPWT) (25)	Group 2 (CPID) (25)
Staphylococcus	11	10
Streptococcus	17	13
Acinetobacter	02	03
Pseudomonas	03	08
Klebshiella	03	04
Escherichia coli	09	07

Other anaerobes	02	-
Clostridia	02	02

RESULTS

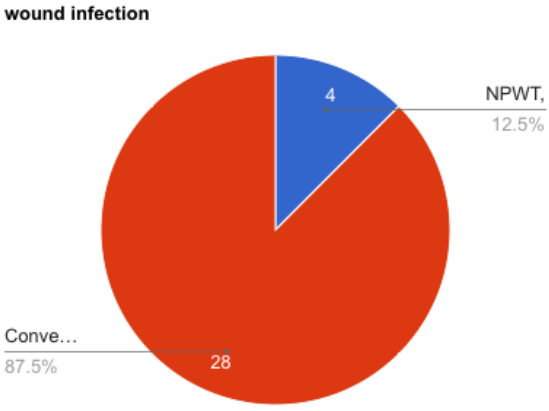
The patients were scored and both the groups were compared, which showed the following results,

1. GENDER



Gender distribution in conventional and NPWT has no significant difference, with p value of > 0.05.

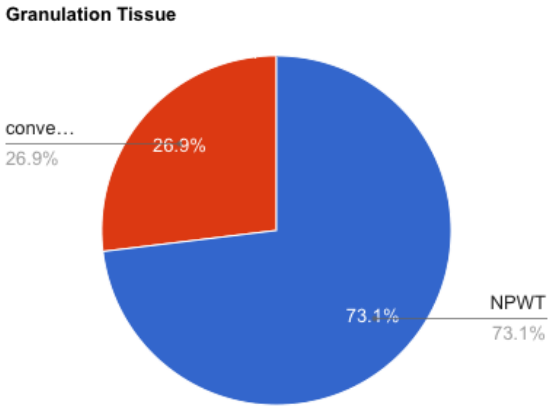
2. WOUND INFECTION



The risk of wound infection is comparatively less in NPWT, as the negative pressure of -125 significantly acts and prevents the growth of the organism.wound infection about 4% of NPWT group and 28% in conventional group, which signifies the higher risk of wound infection in conventional group, with significant p value of 0.039.

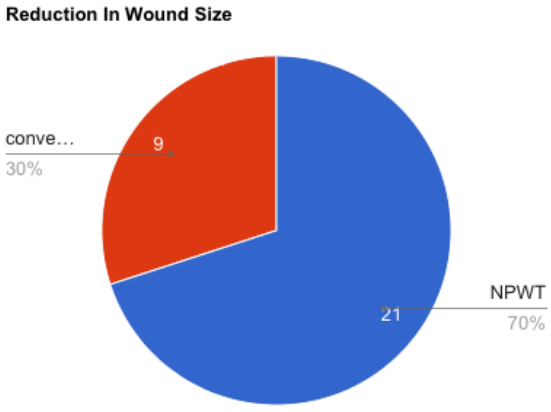
3. APPEARANCE OF GRANULATION TISSUE

The appearance of granulation tissue was measured at the end of 1week, which showed significant appearance of granulation tissue in NPWT group 76% and 28% in conventional group, p value being significant.



4. REDUCTION IN WOUND SIZE

The size of the wound was reduced in the NPWT group with mean surface area being 40.44cm2 and conventional group 38.2 cm2, after wound management NPWT showed 36.08±2.8 and conventional group showed 37.6 ± 2.7, which was statistically significant.



5. PAIN

The below table shows that there is statistically significant reduction in mean scores for pain in negative wound pressure therapy when compared to conventional group. i.e the mean pain score in collagen group is 2.7 and 1.2 on day 1 and 7 after dressing which is very less compared to conventional group which has score of 5.2 and 3.04 on day 1 and 7. (p -0.001 by independent t test). This illustrates that NPWT is effective in pain relief compared to conventional dressing.

DAY	CONVENTIONAL GROUP (mean+/- S.D)	NPWT (mean+/- S.D)
1	5.2+/-1.2	2.7+/-0.93
	Mean difference=2.480 p value=0.001	
7	3.04+/-1.3	1.2+/-0.81
	Mean difference=1.80 p value=0.001	

COMPARISON OF MEAN SCORES OF PAIN AT DAY 1 AND 7 IN BOTH GROUPS

DISCUSSION

The weight bearing part of the entire body being lower limb, hence prevention of Necrotising soft tissue infection , limits further progression to amputation. Recent Advances in raw area wound management have improved.

The relevance of NPWT in healing raw areas post wound debridement has proved effective in our study.

On day 14, ulcer area was observed, which showed a decrease in rate of infection with 6.7% showing positive for culture after treatment with negative pressure therapy.

Povidione iodine has antimicrobial properties which have been used for 170 years, and cytotoxicity limits its use. Because of its short action frequent wound dressing is needed, which limits its use. Moist environment improves wound healing.

Vascularity, volume and velocity of blood flow to the wound is improved in negative pressure therapy. Edema of the wound is reduced after decrease in interstitial pressure, which improves blood flow and healing of wound, also prevents obstruction of lymphatics. It stimulates neo vascularisation, healthy granulation, proliferation of cells causing mechanical stress to wound.

Streptococci and staphylococci being the most common organism encountered in cutaneous infection, including MRSA. In case of immunocompromised patients broad diagnosis must be made.

Broad spectrum coverage antibiotics are considered, to reduce the bacterial load, covering most gram positive, negative and anaerobic. Combined surgical debridement and broad spectrum antibiotics is considered to improve wound healing. Local wound hygiene, early initiation of therapy for primary wounds reduces the risk of NSTI.

Individuals with recurrent cellulitis may benefit from chronic antibiotic suppression.

Conclusion

Our experience of using two different techniques for wound care among individuals suffering from acute necrotizing fasciitis showed that the wound treated with the VAC technique appeared less oedematous. While there was no distinct difference in patient cost, the VAC technique could decrease the morbidities associated with wound care.

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