

ROLE OF NEGATIVE PRESSURE WOUND THERAPY IN MANAGEMENT OF ACUTE WOUND IN TERTIARY CARE CENTRE

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Abstract

Introduction: In a surgical ward acute and continual wounds have an effect on a minimal of 1% of the population. Vacuum assisted closure would possibly be a universally established approach for dressing. Vacuum-assisted wound closure (VAC) is a technique of lowering air pressure around a wound to improve the healing process.

Objectives : To study the advantage of vacuum assisted closure over conventional dressing in the management of acute wounds

Methodology:

Study design: Randomised controlled trial

Study setting: Surgery department, Karpaga Vinayaga Medical college

Sample size: 33 in each group

Group A – Negative pressure wound therapy

Group B – conventional dressings

Study period : 3 months

Results: Most of the patients in the study population was in the age group of 41 -60 years. 82% of the study population was within the age group of 41-60 years. The two groups are comparable with their baseline characteristic of age and the P value is more than 0.05. Wounds were more common in males than females. The hospital stay is less in VAC dressing, when compared to the conventional dressings, who have an average hospital stay of 28 days and the relation is statistically significant (p-value < 0.05). Mean hospital stay in cases is 21 compared to stay of 28 in control group.

Conclusion: From the study results it is obvious that VAC dressing has many advantages in terms of .It could be an appropriate new technology in treating variety of wounds.

Key words: Negative pressure wound therapy, acute wound ,conventional dressing

Introduction

One of the foremost common causes for admission in surgical ward is non healing ulcer. In most of the cases, hospital stay of the many weeks is required for management of the above. In many cases they ultimately choose amputation. Acute and chronic wounds affect a minimum of 1% of the population. no matter etiology, wounds are difficult to treat if coexisting factors (eg. infection or diabetes mellitus) prevent regular wound healing .Vacuum assisted closure might be a universally accepted method for dressing.^{1,2}

Still in our hospital, majority of dressings are conventional. Aim of study is to point out the advantage of V.A.C. over conventional dressing in our hospital. the wants are a bit of froth , some perforated plastic tubing and with it, a suction machine. the froth is placed over the wound and therefore the refore the wound is roofed with an occlusive dressing; by doing this we convert an open wound into a closed controlled wound wherein vacuum are often created through the perforated plastic tubing with a suction machine and the whole apparatus was developed into what's now mentioned as vacuum-assisted closure (VAC).The purpose of this sort of wound management is to decrease wound healing time and to facilitate wound care in situations that otherwise could be considered difficult or nonhealing. Of late,the Negative Pressure Wound Therapy(NPWT) has become a really commonly used method due to its lack of complications and effectiveness in complex situations

Objectives

To study the advantage of negative pressure wound therapy over conventional dressing in the management of acute wounds .

To evaluate total duration of hospital stay

Studydesign

Randomized controlled trial

Studysetting:

Department of General surgery ,Karpagavinayaga Institute of medical science

Study Population:**Inclusion Criteria**

Patients with acute wound less than 6 weeks

Age more than 18 years

Exclusion Criteria:

Fistulas to organs or body cavities

- Necrotic tissue in eschar.
- Osteomyelitis (Untreated)
- Exposed blood vessels
- Gangrenous foot
- Active bleeding and patients undergoing anticoagulant therapy.
- Malignancy
- Patients below 13 years and above 70 years.

- STUDY PERIOD- 3 months
- Sample size
- 33 in negative pressure wound therapy group
- 33 in conventional dressing group

METHODOLOGY

Sequence of procedure

Any dressings from the wound was removed and discarded. A culture swab for microbiology was taken before wound irrigation with normal saline. Surgical debridement was done and adequate haemostasis achieved.

Application of negative pressure

Pre VAC and post VAC C & S is taken. Dressing is given for 72 hour and intermittent suction is given for ten minutes in an hour, daily for 12 hrs with a negative pressure ranging from 100 to 125 mm of mercury. Rest of the time drain of the VAC dressing connected to the Romo vac suction drain. Doppler study to assess the vascularity of the limb before the procedure and xray taken to rule out osteomyelitis. Control group patients are given with conventional dressings. Status of the patient at the time of discharge is noted.

MATERIALS USED FOR STUDY

- OPSITE/Camera cover
 - Transparent adhesive plaster
 - Sponge(sterilized)
 - Suction catheter/Ryles tube
 - Suction drain/ suction apparatus available
- Group A -Negative pressure wound therapy group
Group B -Conventional dressing group

Table 1: Age wise distribution of Study Participants

| Group | Number | Mean | S.D | t | P value |
|---------|--------|-------|-----|-------|---------|
| Group A | 33 | 54.28 | 8.6 | 0.581 | 0.56 |
| Group B | 33 | 56.03 | 9.2 | | |

Table 2: Sex Distribution of Study Groups

| Group | Male | Female | Total | df | CHI Square | P value |
|---------|------|--------|-------|----|------------|---------|
| Group A | 20 | 13 | 33 | 1 | 0.577 | 0.44 |
| Group B | 22 | 11 | 33 | | | |
| Total | 42 | 24 | 66 | | | |

Table 3:Duration of hospital stay among study participants

| GROUP | N | Mean | Std. Deviation | P value |
|---------|----|-------|----------------|---------|
| Group A | 33 | 21.28 | 3.81 | <0.0001 |
| Group B | 33 | 28.52 | 2.24 | |

Table 4:Plan at the end of treatment among study participants

| GROUP | SSG | DISCHARGE | AMPUTATION | P value |
|---------|-----|-----------|------------|---------|
| Group A | 19 | 13 | 1 | 0.048 |
| Group B | 16 | 13 | 4 | |
| Total | 35 | 26 | 5 | |

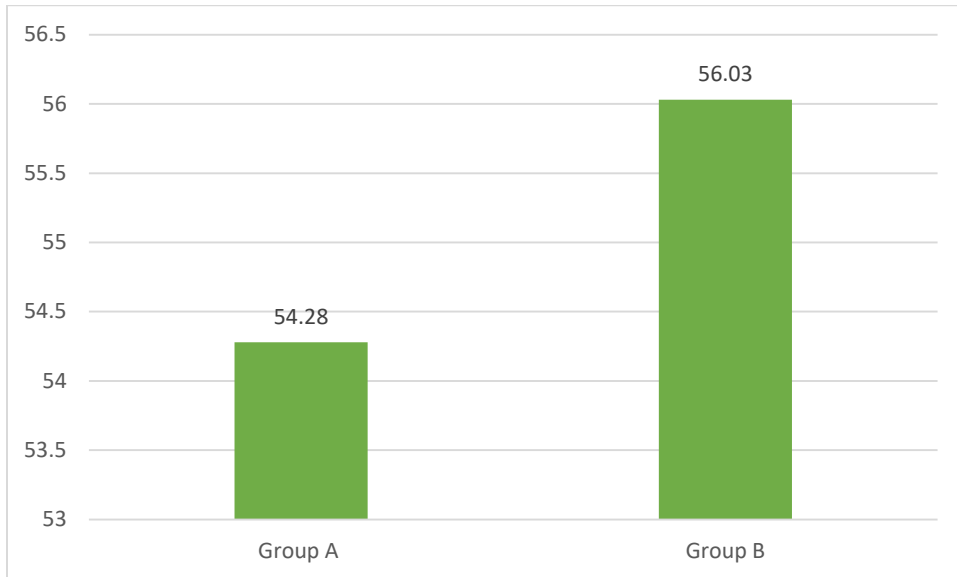


Figure 1:Age wise distribution of study participants

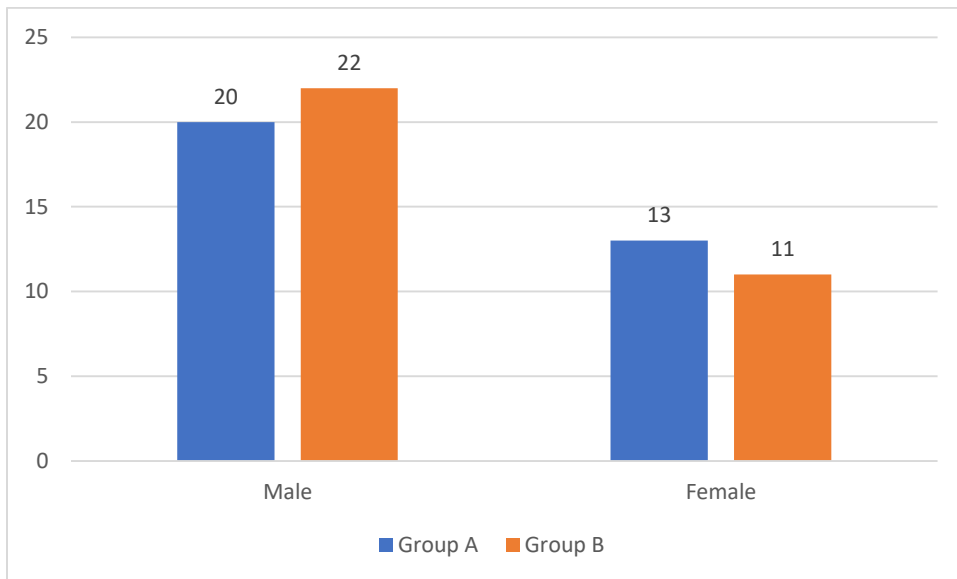


Figure 2:Sex wise distribution of study participants

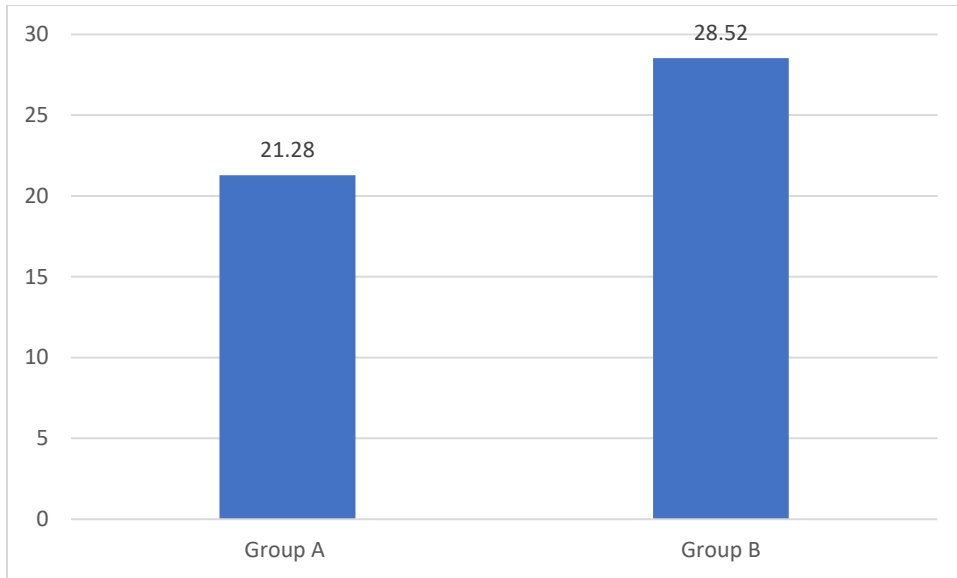


Figure3:Duration of hospital stay among study participants

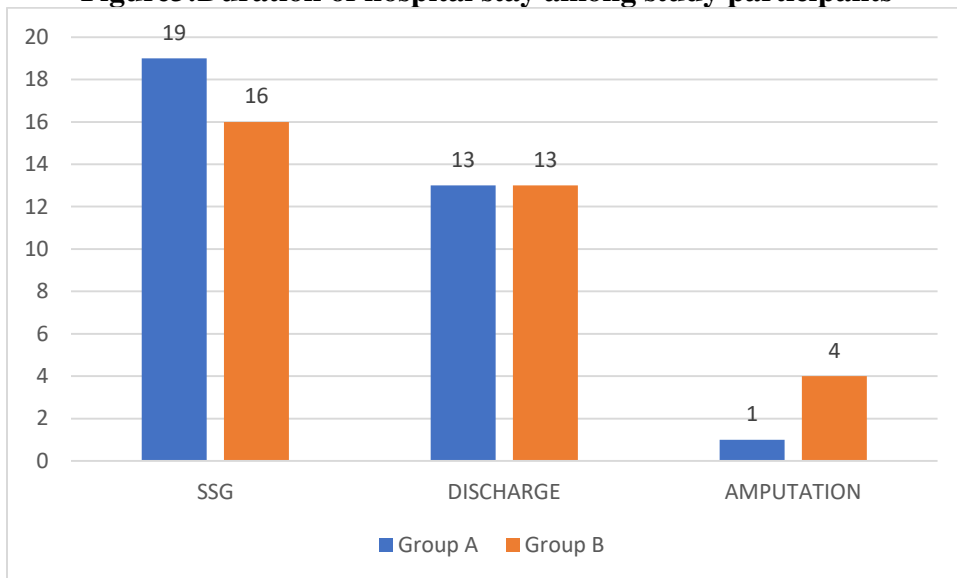


Figure 4:Plan at the end of treatment among study participants



Fig 5 pre vac and post vac picture of post laparotomy with surgical site infection .

RESULTS AND DISCUSSION

Most of the patients in the study population was in the age group of 41 -60 years.82% of the study population was within the age group of 41-60years.Two groups are comparable with respect to age .Wounds were more common in males than females.Wounds were commonly located at the foot (69%) followed by leg(27%), sole 1(2%) and forearm 1(2%).Most common organism cultured was Staphylococcus aureus 50%each.

The hospital stay was found to be only 21days for patients with VACdressing, when compared to the conventional dressings, who have an averagehospital stay of 28 days.Independent Sample t-test shows that the study is significant (p-value<0.0001)

Patients with VAC dressing have more Split Skin Graft before discharge and less rate of amputation when compared to the control group.Pearson Chi Square test shows the study is significant (p-value= 0.048).

Standard treatment for all established wounds incorporates common principles employed in the management of all wound types. These include the removal of necrotic tissue through aggressive debridement that's achieved through debridement using sharp instruments, autolytic debridement by endogenous enzymes which are present in commercially available wound care products and proper moisture balance achieved through the selection of the right wound dressing.^{3,4} for many of the chronic and acute wounds, saline-moistened cotton gauze has been the quality treatment of choice. Therefore, wet-to-moist conventional gauze dressings require close maintenance and excess dedicated nursing time. ⁵Moreover, the removal of a wetto-moist dressing that has been allowed to dry may injure the wound again by removing the just formed granulation and thereby cause delayed wound healing. This procedure also causes

considerable pain, impedes the healing process and increases the danger of infection.⁶

Gauze dressings may appear much less costly per dressing in comparison to the fashionable synthetic dressings but the conspicuous increase within the labor costs and ancillary supplies like gloves used and therefore the biohazardous waste disposal substantially increase the entire cost of conventional dressing.⁷

Negative pressure wound therapy (NPWT), developed at Wake Forest University (Winston-Salem, North Carolina) within the early 1990s, consists of an open-cell foam dressing covered with an adhesive drape. The dressing is connected to a air pump that makes and maintains a sub air pressure (intermittent or continuous). Several thousand NPWT applications are performed every day worldwide, mostly within the us . the foremost commonly used NPWT device is that the vacuum-assisted closure device (Kinetic Concepts Inc [KCI], SanAntonio, Texas).⁸⁻⁹

From 2003 to 2004, revenue for vacuum-assisted closure increased by 45% to \$700 million. Clinical knowledge about the management of difficult-to-treat wounds remains limited due to the shortage of high-quality evidence.¹⁰

The initial device consisted of a foam piece, embedded plastic tubing and a suction machine. the froth was placed over the wound and therefore the wound was covered with an adherent, occlusive dressing; thus converting the open wound to a controlled closed wound whereby vacuum was created through the plastic tubing by a suction machine and therefore the whole system was developed into what's now established as vacuum-assisted closure (VAC).^{11,12}

The aim of this sort of wound management is to decrease wound healing time and to facilitate wound care in situations that otherwise could be considered difficult or non-healing. it's become a popular method for wound management due to its simple nature and skill to manage complex wounds with high efficacy. additionally , numerous other applications are reported, starting from treatment of wounds with exposed bone, tendon, or hardware, to management of acute burns, or maybe as an adjunct to skin grafting and artificial dermis grafting.¹³

Recently, experience was reported using the vacuum-sealed sponge as a dressing over a fresh wound closure Because NPWT is useful in reducing edema in open wounds, it was proposed that this same property would be useful for closed incisions. In situations in which edema is expected to be a significant problem, such as flaps in dependent areas or incisions in obese patients or edematous tissues, this may provide some benefit by improving incisional integrity and reducing wound infection.¹⁴ In our experience, it can be applied over a fresh flap and does not appear to result in any compromise to the underlying flap. In fact, it is possible that the negative pressure actually facilitates blood flow into the distal aspects of the flap.

Comparison with other studies in terms of hospital stay

| | Mean duration of hospitalstay -VAC group in days | Mean duration of hospitalstay- conventional group in days |
|----------------------------|--|---|
| Present study | 21.52 | 28.28 |
| Armstrongeta ¹⁵ | 56 | 77 |
| Singhetal ¹⁶ | 41.2 | 58.9 |
| Vaidiyaeta ¹⁷ | 17.2 | 34.9 |

Conclusion

Management of wounds is always a challenging issue. Delayed healing of wounds is a major problem in the community; besides causing morbidity and disability in the patient, is a burden on our health resources. Therefore there is a need for application of newer and advanced modalities in management of wounds. Vacuum-assisted closure uses negative pressure to assist wound healing and has a positive impact on wound healing by enhancing granulation tissue formation and wound closure, thus providing a modern wound care system for the poor at an affordable cost.

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