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Original Article

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Cost effective alternative for Negative Pressure Wound Therapy

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ABSTRACT

Negative-pressure wound therapy is a technique to achieve wound healing in patients with non-healing wounds; vacuum-assisted closure (VAC) therapy is a technique to accelerate the healing of non-healing ulcers that fail to heal on their own (primary healing). The efficacy of VAC dressings has been demonstrated in several randomized controlled studies, which have shown significantly faster wound healing rates compared to conventional wound therapy.

The vacuum-assisted closure (VAC) has proved to be very promising in the management of wounds, especially difficult large wounds with cumbersome dressings, increasing the chances of infection. Since 65% of Indian population belongs to lower class or lower middle class, this approach of management works wonders. It's much more feasible and is a much more cost effective idea. Though there are various commercially prepared and manufactured vacuum assisted closure dressing materials, these are often unavailable or unaffordable to patients in developing countries. NPWT systems commercially available (VAC™ system, KCI Inc., USA) are costly precluding widespread use. Our "cheaper" vacuum dressing has been found to be, affordable for our patients and most importantly effective in wound management. The aim of this paper is to describe the use of our own Vacuum Assisted Closure and to highlight its effectiveness. The cheaper, and easier method of vacuum dressing has a promising potential, and can be used in any basic medical set up, ranging from rural to urban settings. This could be a paradigm shift in the management of long term wounds in smaller set ups. It also brings about a change in the perspective of expensive advances in the surgical field.

Key Words: *Negative pressure wound therapy, Vacuum assisted closure therapy, chronic wounds, cost effective*

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INTRODUCTION

Negative-pressure wound therapy is a technique to achieve wound healing in patients with non-healing wounds; vacuum-assisted closure (VAC) therapy is a technique to accelerate the healing of non-healing ulcers that fail to heal on their own (primary healing)[1,2] Delayed wound healing or non-healing of ulcers is a significant health problem, particularly in older adults.

The efficacy of VAC dressings has been demonstrated in several randomized controlled studies, which have shown significantly faster wound healing rates compared to conventional wound therapy[1].

It is postulated that various mechanisms might be responsible for the beneficial results obtained from VAC. It is proposed that the removal of the interstitial fluid decreases localized edema and increases blood flow, which in turn decreases tissue bacterial levels[3]. It has since been advocated that the application of sub-atmospheric pressure produces mechanical deformation or stress within the tissue resulting in protein and matrix molecule synthesis and enhanced angiogenesis.

The practice of exposing a wound to sub-atmospheric pressure is relatively new and was first described by Fleischmann et al. in the year 1993[4]. Although, the first reports about the use of negative pressure wound device came from Argenta and Moryk was in the year 1997[5], the full-fledged use of VAC dressings has taken its time to make its mark in the Indian healthcare system.

Since 65% of Indian population belongs to lower class or lower middle class, this approach of management works wonders. It's much more feasible and is a much more cost effective idea.

Though there are various commercially prepared and manufactured vacuum assisted closure dressing materials, these are often unavailable or unaffordable to patients in developing countries. NPWT systems commercially available (VAC™ system, KCI Inc., USA) are costly precluding widespread use. Our "cheaper" vacuum dressing has been found to be, affordable for our patients and most importantly effective in wound management. The aim of this paper is to describe the use of our own Vacuum Assisted Closure and to highlight its effectiveness. The cheaper, and easier method of vacuum dressing has a promising potential, and can be used in any basic medical set up, ranging from rural to urban settings[6]. This could be a paradigm shift in the management of long term wounds in smaller set ups. It also brings about a change in the perspective of expensive advances in the surgical field.

Aim

To analyse the efficacy of cost effective custom made vacuum assisted closure in a non-healing wound in a tertiary care centre in Northern Maharashtra

Objectives

1) To analyse the cost effectiveness for vacuum assisted closure with custom made equipment
2) To analyse the efficacy of a cost effective vacuum assisted closure

MATERIALS

80 patients aged between 20–85 were prospectively studied for non-healing wounds admitted in SMBT Hospital with large wounds. Custom made VAC dressing was kept for over a period of 1-2 weeks. Wounds were treated until they spontaneously closed or surgical completion by means of split skin grafting.

METHODS

Study participants –all IPD patients with chronic non healing wound in general surgery ward
Study design – Descriptive study
Interventions –cost effective vacuum assisted closure for IPD using the following –

1) Ryle's tube no. 20
2) *Smith & Nephew Opsite* dressing OR *3M Ioban* drape
3) Sterile sponge
4) Suction tube (Polymed set)
5) Central suction

Observational definitions –
INCLUSION CRITERIA– all patients with non-healing wounds, including laparotomy incisions, diabetic foot ulcers, venous ulcers etc
EXCLUSION CRITERIA–patients aged < 10 years
Sample size –80

Intervention–

Every patient is subjected to extensive wound debridement; the wound is irrigated and washed with saline. The wound is covered with sterile foam directly applied, and the Opsite dressing or Ioban drape is adhered firmly all around the wound, creating a vacuum airtight zone. By the use of a Polysuction set, the wound is connected to a suction machine to create the vacuum effect. Effort was made to keep the suction pressures at between -120mmHg to -150mmHg. The change of dressing was done every five days. However, occasionally the dressings were changed before day 5 when the dressing was noticed to be wet.

RESULTS

VAC dressing was used in 80 patients with large wounds, of which 56 were male and 24 were female.90.1% patients were managed by STSG, 6.3% by secondary suturing and 3.8% healed by secondary intention. Pain was experienced by 28% of the patients, 5% had hypoalbuminemia, 3.8% had surrounding skin maceration. By the 2^{th} week, granulation tissue appeared in 94.34% in patients with the cost effective VAC dressing.

A classic example is shown here below. Here is a picture of 70 yr old male, who presented with a large posterior thigh abscess on the right side. He was taken for emergency wound debridement, and then went through 2 cycles of this cost effective vacuum dressing. Afterwards he was taken up for skin grafting and upon follow up, he showed excellent results.

The patients treated with VAC dressing showed satisfactory wound reduction capabilities.

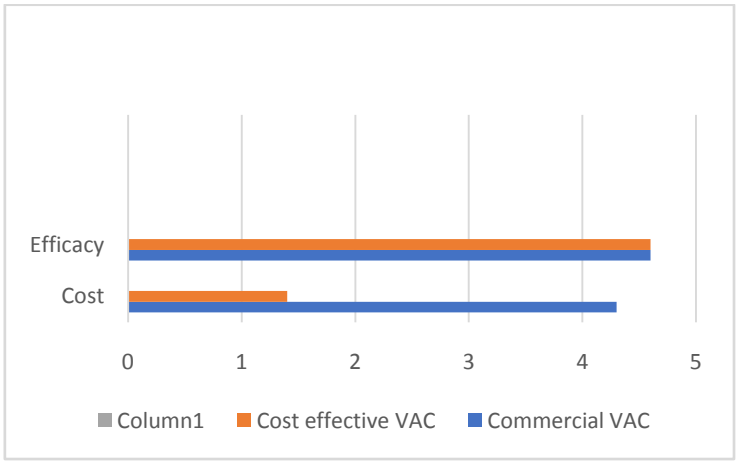
Cost effectiveness –Standard VAC machine costs anywhere Rs. 5000 – Rs. 12000per application as per regular VAC applications[6], whereas by the method used the average cost is reduced to less than Rs. 500 per application, which is 10% of the standard cost.

Patient satisfaction was excellent in all the patients. Every patient gave a feedback of low cost and high quality work.

DISCUSSION

The VAC treatment applies localized negative pressure applied to a special dressing positioned within the wound cavity or over a flap or graft that assists with the removal of interstitial fluid thereby decreasing localized oedema and increasing the blood flow[7,8]. Thus, decreasing the tissue bacterial levels[9]. Also, the mechanical deformation of cells increases the rate of cell proliferation due to protein and matrix molecule synthesis.

The vacuum-assisted closure (VAC) has proved to be very promising in the management of wounds, especially difficult large wounds with cumbersome dressings, increasing the chances of infection.



In this chart we can see clearly that while the efficacy of the cost effective vacuum dressing and the commercially available vacuum dressing is the same, the cost of the commercial vacuum dressing is far more than that of custom made one.

It is labelled against the rating from 0-5, where –

1) Efficacy – 0 represents no visible effect and 5 represents healthy granulation with no slough
2) Cost – 0 represents Rs 0 and 5 represents Rs. 10,000.

Besides there were no costs of application and maintenance as all manpower and most of the material is free. The patient had to buy only the adhesive drape used in the VAC therapy. Rest of the things including the foam, drainage tubing and manpower was provided by the hospital free of cost to the patient. We used a wall mounted vacuum creating apparatus for study, which is also property of hospital.

CONCLUSION

The vacuum-assisted closure (VAC) has proved to be very promising in the management of difficult to heal wounds. Unfortunately, VAC therapy is unavailable or unaffordable to patients in low-income countries. As a result there is the need for improvisation of appropriate technology[10]. In our practice our "cheaper" vacuum dressing has been found to be affordable for our patients and most importantly effective in wound management. With vacuum-assisted closure therapy, wound healing is at least as fast as with modern wound dressings. We observed that the use of cost effective vacuum closure technique reduces the cost of the treatment modality by less than 10% of standard VAC. This will prove effective and economical amongst the lower socio economic strata in Northern Maharashtra.

REFERENCES

1. Robson MC, Steed DL, Franz MG. Wound healing: biologic featuresand approaches to maximize healing trajectories. CurrProblSurg. 2001;38(2):72–140.
2. Steve Thomas. An introduction to the use of vacuum assisted closure.2001.
3. Alonso JE, Lee J, Burgess AR, et al. The management of complexorthopaedic injuries. SurgClin North Am. 1996;76(4):879–903.
4. Fleischmann W, Strecker W, Bombelli M, et al. Vacuum sealing as treatmentof soft tissue damage in open fractures. Unfallchirurg. 1993;96(9):488–492.
5. Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new methodfor wound control and treatment: clinical experience. Ann PlastSurg. 1997;38(6):563–577.
6. Citation: Nsaful KO, Gentil S. Wound management using homemade vacuum dressing, affordable and customized (homemade vac). IntPhys Med Rehab J.2021;6(2):41–45. DOI: 10.15406/ipmrj.2021.06.00279
7. Madhav V, Babu BC. Vacuum assisted therapy in treatment of soft tissue injuries associated with gustilo Anderson compound grade 3B fractures. Int J Orthop Sci. 2016;2(2):101-4.
8. Song DH, Wu LC, Lohman RF, Gottlieb JL, Franczyk M. Vacuum-assisted closure for the treatment of sternal wounds: the bridge between debridement and definitive closure. PlastReconstr Surg. 2003;111(1):92-7.
9. Meara JG, Guo L, Smith JD, et al. Vacuum-assisted closure in thetreatment of degloving injuries. Ann Plast Surg. 1999;42(6):589–594.
10. Kolios L, Kolios G, Beyersdorff M, Dumont C, Stromps J, Freytag Set al. Cost analysis of topical negative pressure therapy for traumatic acquired wounds. Ger Med Sci. 2010;8:Doc13