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Dr. Pradeep Elangovan
Assistant Professor, Orthopaedics, Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India

Dr. Venkataraman M
Associate Professor, Orthopaedics, Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India

Dr. Prem Regis PA
Postgraduate, Orthopaedics, Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India

Corresponding Author:
Dr. Pradeep Elangovan
Assistant Professor, Orthopaedics, Chettinad Hospital and Research Institute, Kelambakkam, Tamil Nadu, India

Role of vacuum assisted closure in orthopaedic practice a hospital based study

Dr. Pradeep Elangovan, Dr. Venkataraman M and Dr. Prem Regis PA

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Abstract
Wound infections in orthopaedic practice needs early attention and rapid management. Especially with implants in situ needs aggressive treatment, to avoid complications leading to implant failure. Hence thorough wound debridement should be done for patients which may lead to difficult closure or raw areas. Soft tissue injuries along with fractures are also more common in orthopaedic practice, which may further require grafting in future. Here we present 22 patients from our hospital from year may 2017 to may 2018 in whom we used vacuum assisted closure in patients who had wound infections with implants in situ and also in patients with extensive soft tissue infections with fractures. Thus we found Negative pressure wound therapy plays a significant role in orthopaedic practice as it decreased time of hospital stay promoting faster healing of wounds by shrinkage of wound size and decreasing infection rates.

Keywords: Granulation tissue, negative pressure wound therapy (NPWT), vacuum assisted closure (VAC), trauma, fracture, soft tissue injury

1. Introduction
Negative pressure wound therapy (NPWT), was introduced in North America in 1997 by Argenta and Morykwas [1, 2]. NPWT supplements selected wounds at high risk for complications, infected wounds with large raw area which aids in shrinkage of wound and controls infection rates. Hence vacuum assisted dressing is being used in various fields of medicine for wound management in General surgery, Orthopedics, Plastic surgery etc. VAC is a non-invasive active wound closure system that uses controlled localised negative pressure to promote healing in acute and chronic wounds.
VAC is a method to accelerate the healing of wound using negative pressure. It works by both fluid based and mechanical mechanism. Fluid based mechanism in which it removes excessive interstitial fluid, improves microcirculation and oxygen delivery and removal of waste products and local toxins from the wounds. Mechanical mechanism in which Negative pressure causes contact wound dressing to collapse. The force is drawn to the wound edges, drawing them closer together.

1.1 Mechanism of action: It Promotes granulation tissue formation, stimulates localised blood flow, reduces bacterial colonization, provides moist wound healing environment, reduces localised edema, enchances epithelial migration, Applies negative pressure to uniformly draw wound closed (wound contraction).

2. Materials and Methods
This study was carried out in department of Orthopedics, Chettinad health city and research institute, Chennai during the period from may 2017 to may 2018. This study included thirty patients with total 22 wounds were treated. All the wounds larger than 5-6cm, which were contaminated and which needed further skin grafting or flap cover were included in our study.

2.1 Inclusion criteria
1. Wound size larger than 6cm.
2. Orthopedic wounds.
3. Wound with underlying exposed bone.
4. Patient giving consent for VAC

2.2 Exclusion criteria

1. Patients Allergic to adhesive drape.
2. Pain and discomfort when suction is applied initially.
3. Patients with necrosis and other skin problems.

2.3 Method of application

The patients with wounds of larger than 5cms which required further treatment are selected and thoroughly cleaned using saline. Wound cultures are taken in all the patients and any dead tissue found is removed. The VAC in all the patients was thus applied in bed side setting. The sterile gloves, dressing tray, sponge, opp-site, suction tube, vacuum suction are used for applying the dressing.

Steps in application of VAC:

1. Cleaning the wound
2. Removing of any necrotic tissue
3. Removal of hair if found around borders
4. Cleaning by use of normal saline
5. Skin dried and prepared
6. Foam is cut according to size of wound
7. Foam applied in wound with suction and packed using offsite

The average time required to apply the VAC dressing in the ward is about 30 minutes. The standard pressure range used is about 125mmHg to 200mmHg. The VAC is usually applied continuously for the first two days. The dressing is changed if there is any leakage found. It is changed until the healing and decrease in size of wound.

Fig 1: Materials used in bedside VAC dressing

Fig 2: Pictures of wounds were we applied VAC dressing

Fig 3: Images showing Wounds with vacuum dressing in place

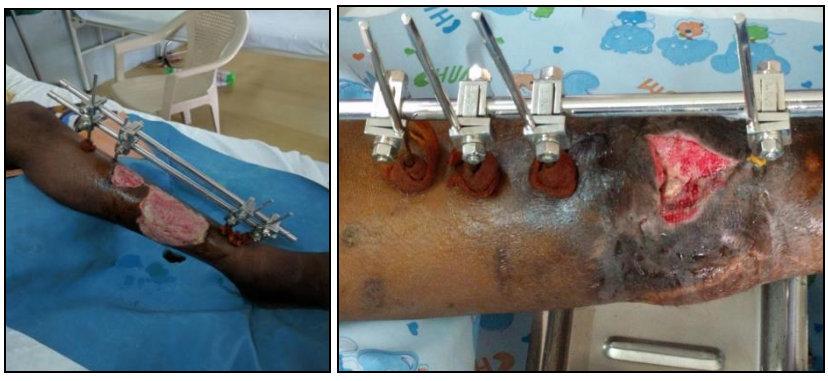

Fig 4: Wound after Vac application showing decrease in size of wound and granulation tissue

3. Results

In our study of Vacuum assisted closure in contaminated wounds in orthopaedic practice, we treated about twenty-two patients. In our study 15 patients were males and 7 patients were females. In our study we found that VAC dressing increased the rate of healing, decreased the time of stay in hospital, it reduced the bacterial contamination and also decreased the number of dressings. None of the patients developed any complications with the use of VAC dressings in our study.

4. Discussion

VAC has been shown to reduce the wound size and volume when compared with other treatment modalities [3, 4,5]. The VAC dressing has shown reduction in duration of hospital stay in patients [6]. In our study also we were able to achieve good outcome with the use of VAC dressings. It promotes wound healing and shrink the size of wounds in patients and also decreased bacterial count.

Though our study had less number of patients we were able to achieve good results with the use of negative pressure wound therapy. Thus vacuum assisted closure can be considered as a method for treating the contaminated wounds larger than 5cms which requires grafting to achieve good results.

5. Conclusion

The vacuum dressing is one of the methods of treatment for the treatment of contaminated wounds and found to have promising outcome. The Vacuum dressing aims in reducing the size of wounds, reducing risk of infection and faster healing in patients and should be considered in wounds of more than 5cm for better outcomes.

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