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Evaluation of Vaccum Assisted Closure Therapy for Soft Tisuue Injury in Open Musculoskeletal Trauma at Tertiary Heath Care Center-Index Medical College, Indore

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Introduction

Complex musculoskeletal wound due to high energy poses a challenge to the treating surgeons regarding wound healing, coverage and reconstruction.

Despite the advances in treatment to expedite wound healing by several types of treatment regimen including different types of dressings, hyperbaric oxygen therapy, several types of antiseptic agents, skin grafts or local flaps, treatment to these soft tissue injuries present dilemma to the surgeon.

The application of negative pressure removes excess fluid thus promote better capillary circulation and hyperaemia, decreases bacterial load and risk of bacterial colonization and had mechanical effect in drawing wound edges closer. Initially developed in the early 1990s, for the management of large, chronically infected wounds that could not be closed in extremely debilitated patients, the use of vacuum-assisted closure (VAC) has been more recently used in the treatment of traumatic wounds

Materials and Methodology

Aim of Study

The study was conducted with the aim to evaluate the effectiveness of vacuum assisted closure therapy for soft tissue injury in open musculoskeletal trauma.

Design- Descriptive study

Period of study- Study was conducted in the department of Orthopaedic IMCHRC , between Jan 2017 to Dec 2017. The study was conducted after obtaining the permission from ethical committee of the institute.

Sample size

51 Patients were prospectively treated using VAC Therapy ,mean patient age 38yrs (range 18 to 60yrs).Patients were selected from ortho wards. 18 were females & 33 were males.

Inclusive Criteria

Age b/w 18 to 60 yrs Traumatic ulcers open musculoskeletal injuries in extremities that required coverage procedures Acute traumatic soft tissue defects/ infected soft tissue defects

Exclusive Criteria

Diabetes, peripheral vascular disease or chronic osteomyelitis Fistulas to organs /body cavities Exposed blood vessels/nerves. All patients for wound management were subjected to standard radiological assessment of the injured wound/limb. Routine haematological investigation including complete blood count, ESR, blood sugar, HIV, HBsAg & culture was done.

Materials

- Transparent sterile material
- Transparent Adhesive plaster
- Sponge (pre sterilized)

• Suction drain

Sequence of Procedure

Wound preparation

Aggressive local debridement was done before applying VAC therapy.

All necrotic tissues were removed and haemostasis was achieved prior to application of the VAC.

A culture swab for microbiology was taken before wound irrigation with normal saline

Sealing the wound

Sterile open – pore foams containing polyurethane ether foam generally of 400- 600µm was used as a dressing. An adhesive drape was then applied over the wound area with an additional 2-4cm border of healthy skin to provide an intact seal. Special care was taken to ensure wound was covered in all directions with an air tight seal.

Application of Vaccum

Then a hole was created in the film and a self- adhesive evacuation tube was attached over the

hole. VAC machine delivers a controlled uniformly placed intermittent negative pressure of -125mm Hg (7 minute cycle with 5 minute on, 2 minute off).

Dressings were changed after every 4 to 5 days. At every dressing the presence of infection, presence or absence of granulation tissue, erythema, and amount of drainage were noted. Routine bacterial cultures and sensitivity testing were done at every dressing.

Antimicrobial protocols were followed depending upon the culture and sensitivity report.

The vacuum device was used until granulation tissue formed with little or no oedema or drainage After that secondary procedure like skin grafting and secondary procedure were done

Results

There were 33 males and 18 female patients included in the study. The average length of follow up was 6 months

Majority of patients with open injury presented due to road traffic accident (65%), followed by patient who had fall from height (35%). Out of 51 patients presented with open injury, 24 patient had Gustilo Anderson grade 3a, 17 patients had grade 3b, and 10 patient had grade 2 injury. 18 wounds were infected at the start of VAC therapy. However, all patients were cleared of bacterial infection by the end of VAC therapy.

In 7 patients, repeated surgical debridement was done due to presence of infection. VAC therapy over the wound was administered for an average of 15 days ± 7 days (range 8 to 30 days)

The patient wound area at the time of initial presentation ranged from 5.8 to 118.0 cm 2 , the average area being 46.8cm 2 . After VAC therapy, the wound area ranged from 3.2 to 100.0cm 2 , the average area being 38.0cm 2 . There was decrease in wound size attained by VAC therapy ranged from 2.6 to 24.4cm 2 , with an average reduction of 10.55cm 2 later split skin grafting was done

Discussion

The use of VAC to promote wound healing was first documented by Fleischman et al., [9]. The US Food and Drug Administration (FDA) approved the use of VAC for the treatment of non-healing wounds in 1995. Morykwas and Argental et al., suggest negative pressure increases blood flow as evidenced by hyperaemia [2]. They found that the peak blood flow at 125 mm Hg of vacuum setting. The application of negative pressure removes the excess fluids which are known to obstruct the microcirculation and decreases oxygen supply and clearance of locally accumulated toxins. The removal of this excess fluid promotes better capillary circulation and hyperaemia and decreases the bacterial load and the risk of bacterial colonization. Standard wound dressing required prolonged period, repeated debridement, more trauma to granulation tissue and had poor patient compliance. The whole

procedure of VAC application converts an open wound into a controlled and temporarily closed compartment with negative pressure uniformly applied over it.

Limitations

The main limitation of our series is small number of patients, lack of control group, and absence of functional outcome scores.

Conclusion

VAC Therapy provides sterile and controlled environment to large, educating wound surfaces by controlled application of sub-atmospheric pressure. It prepares wounds for closure via split thickness skin grafting or secondary closure in lesser time leading to decreases the number of secondary procedures & less overall morbidity with decreased hospital stay. It can be used as alternative method in infected / non – healing wounds, not responding to standard treatment.

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