

COMPARE THE EFFICACY OF VACUUM ASSISTED CLOSURE (VAC) THERAPY TO STANDARD WOUND THERAPY IN HEALING OF SOFT TISSUE IN OPEN MUSCULOSKELETAL INJURIES: A RANDOMIZED COMPARATIVE STUDY.

Orthopaedic

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ABSTRACT

Open musculoskeletal injuries are one of the complicated injuries encountered by orthopedic surgeon which is challenging financially, mentally and in terms of outcomes. A healthy wound bed is mandatory for a speedy healing and early closure of the wound. The major disadvantages with standard wound dressing methods are long hospital stay, increased rate of infection, increased number of surgical intervention and wound complications. A new method to overcome these disadvantages is **Vacuum assisted closure (VAC)** therapy, involves application of continuous or intermittent pressure on a sealed wound. The aim of present study to compare the efficacy of vacuum assisted closure (VAC) therapy to standard wound therapy in healing of soft tissue in open musculoskeletal injuries. Total sample size take in the study was 60 patients and after primary treatment, randomization done and patients were distributed in 2 groups: 30 patients were allotted standard wound dressing group and 30 VAC therapy group. To conclude, we have found that in comparison with Standard wound dressing, VAC therapy significantly reduces the duration of hospitalization and time to complete coverage of traumatic wound.

KEYWORDS

Vacuum assisted closure, VAC therapy, Wound dressing.

INTRODUCTION-

Open musculoskeletal injuries are one of the complicated injuries encountered by orthopedic surgeon. The management of these types of injuries has presented a very long standing challenge to treating surgeon in terms of financially, mentally and end outcome. These types of injuries should be broadly handled in two parts- number one is bony instabilities which can be treated with external fixators or internal fixation, and the other which is most cumbersome and difficult part of treatment is the management of soft tissue injury. There are various methods for wound coverage like dressing with hydrocolloids, dressing with povidone iodine ointment or in severe soft tissue loss we can even use synthetic skin grafts. These have been mentioned in literature and have been considered very useful to the plastic surgeons in treating acute wounds and severe burn injuries^[1,2]. Previously early coverage with a free muscle flap or local flap has been the best option in these types of wounds.^[3-6] The major disadvantages with all above dressing methods are long hospital stay, increased rate of infection, increased number of surgical intervention and wound complications. Morykwas and Argenta described a new method to overcome these disadvantages known as Vacuum Assisted Closure (VAC) therapy.^[7] The main principle of VAC therapy based on Negative pressure that's why it is aka Negative Pressure Wound Therapy (NPWT) and Negative Pressure Therapy (NPT). They mentioned that healing of the wounds was much faster with VAC therapy in compare to standard wound therapy. The aim of present study to compare the efficacy of vacuum assisted closure (VAC) therapy to standard wound therapy in healing of soft tissue in open musculoskeletal injuries.

MATERIAL AND METHODS-

A Prospective Randomized comparative study was conducted in Mahatma Gandhi Medical College, Jaipur from Jan 2019 to June 2020 involving 60 numbers of patients. Patients with open musculoskeletal injuries in extremities who gave consent were included while patient with Osteomyelitis and wounds present anywhere else except on extremities were excluded.

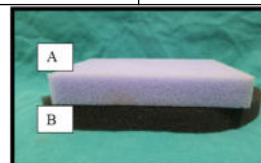
OUTCOME: (1) Time interval between injury to wound coverage (primary outcome) (2) Rate of infection (3) Total number of surgical intervention/operations to close wound (4) Length of hospital stay (5) Other wounds complication.

MATERIAL USED FOR VAC:

(1) Foam- In our technique we used the easily available sponge from

any mattress shop after steam sterilization, making it affordable. Density of foam is more important than the pore size of foam in dressing.

Foam used in present study (A)	Foam provided by Company (B)
Open-cell, polyurethane ether foam with density 25kg/m ³ and pore size- 200 to 300 micron meter and. ^[8-9]	Open-cell, polyurethane ether foam with density 22 kg/m ³ to 30kg/m ³ and pore size ranges from 400 to 600 micron meter with. ^[8-9]



- (2) Tubing
- (3) Adhesive occlusive dressing
- (4) Suction machine-For intermittent suction we used suction machine with pressure regulator instead of commercially machine.
- (5) Vacuum Source: Vacuum tubing in ward was used. Pressure in this tube is 80 to 120 mm of Hg, which can be controlled by pressure regulator.

Intermittent negative pressure is applied for half an hour with interval of half an hour. This was also explained to nursing staff, patient's attendant and patients himself. A simple mobile timer was used for proper timing of dressing. Pressure was set at 125 mm of Hg. Dressing was changed after every 4th day, but if any sign of infection was present than it should be changed after 24 hours. The modified method we used in present study was not costly as commercially available VAC dressing kit so patients were ready to use it.



Clinical picture of Patients with VAC dressing



Case 1- 30 Year Old Male. Mode –rta Diagnosis-compound Fracture Left Tibia-fibula.



Case 2- 40 year old male, RTA DIAGNOSIS-FRACTURE 1st METATARSAL

RESULTS-

Total sample size take in the study was 60 patients and after primary treatment, randomization done and patients were distributed in 2 groups: 30 patients were allotted control group (standard wound dressing) and 30 patients test group (VAC therapy). In our study both groups also had similarities in their baseline characteristics that included Age, BMI, Hb level, smoking and alcohol intake. The mean age was 36.06 years in control group and 34.73 years in test group. In both groups, most of the patients were male i.e. 95% while females attributed to only 5% of the patients. In control group 96.67% were male and in test group it is 93%. Smokers were 11 (36.67%) out of 30 patients in test and 10 (33.33%) out of 30 in control group while alcohol consumption was seen in 8 (26.66%) patients in test and 4 (13.33%) patients in control group. Mean BMI was 21.24 kg/m² in test group and 21.47 kg/m² in control group. Mean haemoglobin level was 11.08 gm/dl in test group and 11.00 gm/dl in control group. Most common mechanism of injury in our study was Road Traffic Accident (54/60). In most of the patients dressing was applied at leg region i.e. 28/60 (46.66%) out of which standard wound therapy had 13 patients (21.66%) and VAC therapy had 15 patients (25%). Apart from leg other sites that were involved were: around the knee joint (30%) which included knee joint, distal part of thigh and proximal part of leg, foot (8.33%), Ankle (3.33%), Arm (3.33%) and Thigh (8.33%). Fracture leg bone was the most common diagnosis and soft tissue defect in the leg region was the most common injury in both test and control group. SSG was done in 20 patients in test group and 18 patients in control group. Delayed primary closure was done in 6 (20%) patients out of 30 in test group and 4 (13.33%) patients out of 30 patients in control group. A flap was needed for wound coverage in 2 patients in test group and 6 patients in control group. While, remaining 2 patients of each test group and control group required combination of both SSG and Flap As recommended by FDA we used the time duration from injury to the wound coverage as the primary outcome measure for wound healing.

Table1: Distribution of patients according to duration of hospital stay.

	TEST	CONTROL
MEAN	14	25.56
MEDIAN	14	25
STANDARD DEVIATION	4.41	10.39
p-value	<0.05 (S)	

Table 2: Distribution of patients according to time needed for wound coverage.

	TEST	CONTROL
MEAN	10.16	25.56
MEDIAN	9	25
STANDARD DEVIATION	5.31	11.71
p-value	<0.05 (S)	

Table 3: Distribution of patients according to total number of dressings required.

	TEST	CONTROL
MEAN	1.16	14.84
MEDIAN	1	16
STANDARD DEVIATION	0.46	6.35
p-value	<0.05 (S)	

DISCUSSION:

In this Prospective Randomized comparative study we demonstrate that the use of VAC dressing in hospital presenting with open musculoskeletal injuries due to high energy trauma results in improved wound healing compared to standard wound dressings. This is reflected by reduce duration of hospitalization and a significantly smaller number of dressings required till coverage of the wound compared to conventionally treated wounds. This is particularly useful while dealing with large tissue defects, as these require smaller number of flaps to cover the wound and a significantly larger group can be managed by delayed primary closure itself.

In present study median duration of wound coverage was 25 days in control group and 9 days in test group while the mean duration of wound coverage was 10.16 days and 25.56 days in test and control group respectively. Total number of dressing for coverage required in test and control groups showed a very significant difference. In the test group mean value of total number of dressing was 1.16 and in control group it was 14.84. In test group infection was seen in 10(33.34%) patients out of which deep infection were seen in 4 and superficial infection was seen in 6 patients while in control group infection was present in 17(56.67%) patients out of 30 out of which deep infection was seen in 8 patients and superficial infection was present in 9 patients. Total number of procedure required for the closure of wound was not considered by any study while in present study, a total 3 procedures were done in 1 patient and 2 procedures were done in 5 patients in control group which mean 20% patients requires more than one procedure. On the other hand, only 1 patient requires more than 1 procedure in test group i.e. 96.66% patients in test group require only 1 procedure for final coverage of the wound.

CONCLUSION:

To conclude, we have found that in comparison with Standard wound dressing, VAC therapy significantly reduces the duration of hospitalization and time to complete coverage of traumatic wound. It reduces the number of total dressing's required as compared to Standard wound dressing in orthopaedic trauma patients. Commercially available VAC dressing kit is costlier as compared to our modified method so patients were more motivated to use this method as compared to commercial ones. So acknowledging the fact that VAC therapy has a definite role in traumatic wounds therefore, we recommend its regular use in all patients presenting with post traumatic soft tissue injuries, when primary coverage is not possible.

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