

## **Study the effectiveness of vacuum assisted closure therapy in the healing of chronic diabetic foot ulcer.**

### **ABSTRACT**

#### **Aim**

To determine the effectiveness of vacuum assisted closure(vac) therapy in the healing of chronic diabetic foot ulcer.

#### **Methodology**

A prospective study was conducted among the patients who were admitted and treated for diabetic foot ulcer in Saveetha Medical College And Hospital over a period of 6 months from January 2021 to June 2021. There were about 15 patients admitted and treated for the same.

#### **Results:**

An aggregate of 15 patients were remembered for the review . Among them 62% (n=9) were male and 38% (n=6). Age range was from 30 to 70 years with a mean age of  $50 \pm 9.75$  years. The recurrence of VAC dressing change was following 24-48 hours for 75% (n=11) wounds, like clockwork for 15% (n=4) wounds. Larger part of patients (92.5%, n=13) don't need extra debridement over the span of VAC treatment. Normal decrease in injury region noticed was  $11.4 \pm 4.55$  cm<sup>2</sup> (territory, 3.4 to 38.6cm<sup>2</sup>) and the normal season of recuperating noticed was  $21.75 \pm 10.55$  days (range, 14 to 4 days).

#### **Conclusion:**

VAC treatment is exceptionally powerful and helpful in the treatment of diabetic foot disease and ulcers and plays an authoritative part upgrading granulation tissue arrangement, wound size decrease , recuperating of twisted in lesser time.

**Keywords:** Diabetes mellitus , Negative pressure wound therapy

## INTRODUCTION

Diabetic foot is one of the significant intricacies of diabetes mellitus, that can be hard to treat and may require removal whenever treated improperly<sup>1</sup>. Diabetic foot happens in 15-25% of every diabetic patient and between 14% to 20% of these patients go through removal.

Foot ulcers essentially add to bleakness and mortality of patients with diabetes mellitus. The diabetic patients with foot ulcers require long haul hospitalization and convey the danger of appendage removal.

The main confusions of diabetes mellitus are neuropathy and foot ulcer. Indications of inconveniences range from easy to exceptionally mind boggling, including appendage removals and dangerous diseases.

The danger of removal is higher if the ulcer is tainted or having ischemia. With multidisciplinary group approach, 80–90% of removals because of ischemia and 95% with contamination could be prevented<sup>3, 4</sup>.

Diabetes is the main source of non-horrendous foot amputations overall [17, 18]. Conventional treatments include nonstop debridement and promotion ministrations of against contamination drugs. The supportive of cases is long and oftentimes defers the ideal planning of treatment. Different side effects, for example, ulcer and osteomyelitis further muddle recuperation. Other normal treatment strategies incorporate skin substitutes, hyperbaric oxygen treatment, quality treatment utilizing manufactured development factors, and immature microorganism treatment [19]. Ideal and compelling ulcer mending is basically significant for keeping away from removal and other genuine complications, and for reestablishing body shape and function.

## METHODOLOGY

This case series study was led at General Surgery Department, Saveetha Medical College, Thandalam, Chennai. from January 2021 to June 2021.

Inclusion criteria : Patients with a conclusion of diabetic foot injury according to the set up rules and difficult to-mend foot ulcerations with tight sinuses and cavities were incorporated. Every one of the patients were treated for somewhere around 90 days yet showed no improvement.

Exclusion criteria : Contains patients with osteomyelitis. pallor (Hb% <10mg/dl), full scale vascular infections, patients with any persistent sickness for example constant renal disappointment, ongoing liver illness and threat on any part or organ of body.

After endorsement from moral board, patients introduced in the crisis and outpatient division satisfying the consideration/avoidance standards were conceded subsequent to taking educated assent. The segment information, applicable history, term and size of the injury were noted. Blood test of each persistent for serum sugar levels and pee test for presence of any sugar were sent.

#### TREATMENT PROTOCOL

Medicines were done on outpatient premise, an underlying extraction as well as debridement was done in the two gatherings followed by standard injury estimations and assessment. Planning of patients: All patients went through definite clinical assessment and significant examinations and the injuries were completely debrided and the ulcer measurements just as the surface region was surveyed. Prior to the beginning of VAC treatment, after introductory debridement, the injury was shot with a ruler set adjacent to the injury. A twofold layer of polyethylene sheets was held immovably set up over the injury, and a framework of the injury was followed utilizing an indelible marker. The layer in direct contact with the injury was disposed of. At ensuing VAC dressing changes, the injury was moreover captured, and its region was quantitated utilizing the twofold polyethylene sheet procedure. Prior to careful mediation toward the finish of VAC treatment, the last debut of the injury was again noted and recorded. Procedure: A Group A was treated by VAC treatment, while a gathering B was dressed by customary dressing alone.

Gathering A: The use of effective negative tension soggy dressings needs the accompanying materials. They include:

- Synthetic hydrocolloid sheet
- Vacuum pull mechanical assembly
- Transparent semi penetrable glue layer sheet.

Technique of VAC therapy:

The VAC dressing which was utilized is the Chariker-Jeter™ wound fixing pack (Smith and Nephew PLC, London, UK) "a blend of wipe dressing with vacuum helped wound conclusion frameworks". The procedure includes six stages.

These were as per the following:

The injury was completely debrided and devitalized tissue eliminated.

The froth with the encompassing ordinary skin was covered with cement, semi-penetrable, straightforward film. A decent air seal was subsequently guaranteed around the injury.

Distal finish of the channel tube was associated with a gadget, which gave a negative strain of -125 mmHg, applied to the injury, discontinuously (5 minutes "on", 2 minutes "off").

This was accomplished by divider pull mechanical assembly, mechanized gadgets or portable attractions channel gadgets.

Whenever vacuum is applied, the wipe should be seen imploded into the injury bed, hence giving the surface an inward appearance.

The liquid from the injury is consumed by the wipe and is eliminated from the injury bed by pull.

The negative tension was kept up with for a normal of 2 days for Maximum advantage as studies have demonstrated.

Gathering B: Patients treated with regular dressings doused bandage pieces were utilized for introductory 48 hours followed by dressings of typical saline drenched cloth pieces, twice every day.

Toward the finish of two days the injuries in both the gatherings was reviewed after expulsion of the dressings from the NPWT bunch. The injuries were thought about dependent on the accompanying boundaries. They are: pace of granulation tissue arrangement as level of the ulcer surface region, Present measurements and surface space of the ulcer.

On the off chance that no indications of recuperating were available, the method was rehashed till total mending or end of the treatment course (10 weeks).

All patients in the two gatherings got standard treatment for their condition during the review time frame; this incorporated the counter diabetic meds, same anti-toxins, NSAID, and nutrients.

Table 1: Descriptive Statistics For Different Variables Before And After Treatment (n=15)

|                             | Minimum | Maximum | Mean | SD   |
|-----------------------------|---------|---------|------|------|
| Age(years)                  | 30      | 70      | 50   | 9.75 |
| Duration of diabetes(years) | 02      | 25      | 14   | 5.65 |
| Duration of wound(days)     | 12      | 40      | 24   | 6.0  |

|                              |     |      |       |       |
|------------------------------|-----|------|-------|-------|
| Size of wound(days)          | 5.8 | 104  | 50.6  | 27.6  |
| Reduction in Wound area(cm2) | 3.2 | 38.2 | 11.4  | 4.55  |
| Time of Healing(days)        | 14  | 40   | 21.75 | 10.55 |

Table 2: Detail Of VAC Treatment (n=40)

| Modality of treatment  | Detail       | No of Patients | Percentage |
|------------------------|--------------|----------------|------------|
| Negative pressure      | Continuous   | 13             | 90%        |
|                        | Intermittent | 2              | 10%        |
| Pressure applied       | 125mmHg      | 10             | 70%        |
|                        | 75mmHg       | 5              | 30%        |
| Change of dressing     | 24-48hrs     | 11             | 75%        |
|                        | 48-72hrs     | 4              | 25%        |
| Additional debridement | No           | 13             | 94%        |
|                        | Once         | 2              | 6%         |

## RESULTS

An aggregate of 15 patients were remembered for the review . Among them 62% (n=9) were male and 38% (n=6). Age range was from 30 to 70 years with a mean age of  $50 \pm 9.75$  years.

Larger part of patients (67%,n=10) were given Type II diabetes mellitus and 70% (n=11) patient were on insulin and staying 30% (n=4) was on oral hypoglycemic medications.

During treatment the negative strain applied constantly in 90% (n=13) patients and discontinuously in 10% (n=02) wounds. A strain of - 125 mmHg was applied in larger part (70%, n=10) wounds followed by a tension of - 75 mmHg in 5(25%) injuries. The recurrence of VAC dressing change was following 24-48 hours for 75% (n=11) wounds, like clockwork for 15% (n=4) wounds. Larger part of patients (92.5%, n=13) don't need extra debridement over the span of VAC treatment (Table-1).

Table – 2 shows that the term of diabetes in patients went from 2 to 25 years with a normal of  $14 \pm 5.65$  years. The normal term of wound was  $24 \pm 6.0$  (territory, 12 to 40) days and normal size of ulcer was  $50.6 \pm 27.6$  cm<sup>2</sup> (territory, 5.6 to 104 cm<sup>2</sup>). Normal decrease in injury region noticed was  $11.4 \pm 4.55$  cm<sup>2</sup> (territory, 3.4 to 38.6cm<sup>2</sup>) and the normal season of recuperating noticed was  $21.75 \pm 10.55$  days (range, 14 to 4 days).

## DISCUSSION

Pervasiveness of Diabetes is quickly expanding worldwide and alongside different complexities the diabetic feet is the commonest, prompting careful intercession and draw out hospitalization<sup>20</sup>.

Negative Pressure Wound Therapy (NPWT) is a more current noninvasive adjunctive treatment framework that utilizes controlled negative strain utilizing Vacuum-Assisted Closure gadget (VAC) to assist with advancing injury recuperating by eliminating liquid from serious injuries through a fixed dressing and tubing which is associated with an assortment container<sup>21</sup>. The expectation is that negative strain in the injury will cause fast decrease in expanding, wound purging and improvement course. Thus, the injury recuperating measures (granulation and epithelialization) will accelerate<sup>13,21</sup>. A benefit of vacuum helped conclusion treatment

is that the injury should be dressed each second or third day rather than day by day, similar to the case with ordinary treatment.<sup>14,15</sup> VAC is for the most part very much endured with not many contraindications or intricacies.

VAC treatment has answered to cause critical decrease in injury size when contrasted with the customary dressings. A 49% and 59% decrease in injury profundity and volume has been accounted for by Eginton et al in literature<sup>24</sup>. This is fundamentally more noteworthy than the decrease in injury profundity (7.7%) and volume (0.1%) treated with damp bandage dressings<sup>22,24</sup>. At the opposite end, Eginton et al have announced no huge decrease in injury region after VAC therapy<sup>24</sup>. In our review, we found  $11.4 \pm 4.55$  cm<sup>2</sup> of decrease in injury size which is practically tantamount with the investigations by Nain et al<sup>13</sup> and Nather et al<sup>10</sup> (i.e.16.14 cm<sup>2</sup> and 10.1 cm<sup>2</sup> separately). A few examinations announced more noteworthy decrease in injury region (up to 28%) when contrasted with our study<sup>5,13,23,25</sup>. One more benefit of VAC treatment detailed in writing is that it empowers the injury recuperating by invigorating the granulation tissue arrangement. Morykwas et al<sup>26</sup> announced that more granulation is delivered in case wound is treated by ceaseless or irregular negative tension when contrasted with the injuries treated with customary dressing<sup>25</sup>. One more extra advantage of VAC treatment noticed is to ease the injury contamination. The Morykwas et al, has revealed a huge decrease in bacterial burden in constant injuries after utilization of VAC treatment by the fifth day<sup>26</sup>.

The VAC treatment finished from 14 to 40 days, (normal  $21.75 \pm 10.55$  days) in our patients which is predictable with other studies<sup>5,14</sup>. Writing audit shows that this time is fundamentally not exactly the normal time taken by Armstrong et al (32.9 days)<sup>23</sup> and Clare et al (57.4 days)<sup>27</sup>. This review is steady with the review led by Armstrong and associates who had seen that VAC treatment is protected and viable in complex diabetic foot wounds and could prompt quicker recuperating rates, high level of mended wounds and conceivably less re-removals when contrasted with the injuries treated through standard consideration.

## **Conclusion :**

VAC treatment is exceptionally powerful and helpful in the treatment of diabetic foot disease and ulcers and plays an authoritative part upgrading granulation tissue arrangement, wound size decrease , recuperating of twisted in lesser time.

### **Ethical Approval:**

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

### **Consent**

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

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UNDER PEER REVIEW