



To Compare the Effectiveness of Continuous Versus Intermittent Negative Pressure Wound Therapy in the Healing of Diabetic Foot Ulcerations

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KEYWORDS

Continuous versus
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ABSTRACT:

BACKGROUND: Negative pressure wound therapy (NPWT) is a newer noninvasive system that uses controlled negative pressure using vacuum assisted closure (VAC) devices to help promote wound healing by macro – deformation and micro deformation of tissues, reducing edema, promoting formation and perfusion of granulation tissue and stabilisation of wound environment. This study aims at comparing the effectiveness of continuous versus intermittent negative pressure wound therapy in the healing of diabetic foot ulcerations in terms of wound assessment by Bates-Jensen wound assessment scale at Meenakshi medical college.

MATERIALS & METHODS: This study is carried out at Institute of General Surgery, Private medical college hospital, Kanchipuram. Duration of the study was 1 year between August 2022 and August 2023 to assess the efficacy of intermittent versus continuous negative pressure wound care in the healing of diabetic foot ulcers. Study design was done Using the Bates Jensen wound evaluation scale, this randomized control trial compares the healing effects of continuous vs intermittent negative pressure wound care for diabetic foot ulcers. Sample size: Totally 60 patients are taken up in the study, Continuous NPWT (control) Even IP no. 30 patients Intermittent NPWT (cases) Odd IP no. 30 patients . Sixty patients in all were examined and split into study and control groups. Management ☐ Constant VAC Situation ☐ Sporadic VAC

RESULTS: In our investigation, we found that while granulation tissue appeared early in both patient groups, a greater percentage of patients in the Intermittent VAC group reached 100% (full) granulation tissue earlier than in the Continuous VAC group. Approximately 6.7% of patients in the Intermittent VAC group and 3.3% of patients in the Continuous VAC group achieved wound closure on Day 6.



Comparably, on Day 9, 33.3% of the Intermittent VAC group and 26.7% of the Continuous VAC group had wound closure.

CONCLUSION: we draw the conclusion that, even though VAC therapy has higher wound closure rates, the application of intermittent VAC therapy is preferred for the healing of diabetic leg ulcers due to a slightly higher proportion of wound closure rates in the intermittent VAC group as compared to the continuous VAC group.

INTRODUCTION:

Diabetes mellitus is the most prevalent metabolic disease in the general population. It is characterized by hyperglycemia caused by either absolute or relative insulin insufficiency. The pancreatic beta cells completely stop working, which results in an utter lack of insulin and low blood sugar levels, or hyperglycemia. In situations when there is a relative insulin shortage and varying peripheral resistance to insulin action at the tissue level, the pancreatic beta cells operate properly.

Diabetic foot ulcers are the main consequence of diabetes that causes significant death and morbidity. Diabetes mellitus is characterized by metabolic abnormalities, including hyperglycemia, free fatty acids, and insulin resistance. These conditions can cause macrovascular and microvascular problems, which can result in significant amputation even from minor foot damage. Approximately 25% of individuals with diabetes have a lifelong risk of developing foot ulcers, with potential causes including vascular disease, neuropathy, pressure sores, and foot deformities. Debridement of all necrotic tissues, callus, and fibrous tissue is the cornerstone of treatment for diabetic foot ulcers, with the main objective being wound closure.

Wagner's system of grades

Grade 1: Surface ulcer

Grade 2 Deep ulcer without abscess or bone involvement

Bony involvement in Grade 3 Abscess (as seen by an X-ray)

Grade 4: Heel, toe, and other localized gangrene

Grade 5 severe gangrene throughout the whole foot

A more recent noninvasive method called negative pressure wound therapy (NPWT) uses vacuum assisted closure (VAC) devices to create controlled negative pressure. This helps to promote wound healing by reducing edema, promoting the formation and perfusion of granulation tissue, and stabilizing the wound environment.

Major risk factors for diabetic foot ulcers include low socioeconomic level, barefoot walking, low education, and inadequate facilities for diabetic foot care. An amputation of a limb has a significant effect on the person, resulting in increasing reliance, social isolation, a decline in social interactions, and unemployment. The purpose of this study is to compare the healing effects of continuous vs intermittent negative pressure wound care for diabetic foot ulcers at Meenakshi medical college hospital & research institute using the Bates-Jensen wound evaluation scale.

The goal of the study is to evaluate, using the Bates-Jensen Wound Assessment Scale at the Institute of General Surgery at Meenakshi medical college hospital & research institute, the relative efficacy of continuous versus intermittent negative pressure wound therapy in the healing of diabetic foot ulcerations.

METHODOLOGY:

This study is carried out at Institute of General Surgery, Meenakshi medical college hospital & research institute, Kanchipuram. Duration of the study was 1 year. Study design was done Using the Bates Jensen wound evaluation scale, this randomized control trial compares the healing effects of continuous vs intermittent negative pressure wound care for diabetic foot ulcers. Sample size: Totally 60 patients are taken up in the study, Continuous NPWT (control) Even IP no. 30 patients Intermittent NPWT (cases) Odd IP no. 30 patients



INCLUSION CRITERIA: All diabetic foot ulcers with
• Patients aged between 20 years and 70 years • Grade 1 or 2 ulcers (as defined by Wagner's classification) • Ulcer area ranging between 25cm and 200cm .

EXCLUSION CRITERIA: • Age < 20 years or > 70 years • An obvious septicaemia • Osteomyelitis • Wounds resulting from venous insufficiency • Malignant disease in a wound • Patients being treated with corticosteroids, immunosuppressive drugs or chemotherapy • Any other serious pre existing cardiovascular, pulmonary and immunological disease .

RESULTS:

Randomized control trial conducted at Meenakshi medical college hospital & research institute , between August 2022 and August 2023 to assess the efficacy of intermittent versus continuous negative pressure wound care in the healing of diabetic foot ulcers. Sixty patients in all were examined and split into study and control groups.

Management ◇ Constant VAC Situation ◇ Sporadic VAC

Table-1 Showing Age distribution of the study population

Age Group	Frequency	Percent
30 to 40	3	5%
40 to 50	15	25%
50 to 60	24	40%
60 to 70	18	30%
Total	60	100%

It indicates that out of a total sample size of 60 individuals, 5% fall within the age bracket of 30 to 40, accounting for 3 individuals. Moving to the next age group of 40 to 50, there are 15 individuals, representing 25% of the total sample. The largest portion of the sample

lies within the age group of 50 to 60, comprising 40% of the total with 24 individuals. Finally, the age group of 60 to 70 encompasses 18 individuals, constituting 30% of the total sample.

Table -2 Showing Gender distribution of study population

Gender	Frequency	Percent
Male	38	63.3%
Female	22	36.7%
Total	60	100%

Out of a total sample size of 60 individuals, 63.3% are male, constituting 38 individuals. Conversely, females account for 36.7% of the total, with 22 individuals falling into this category.

COMPARISON OF WAGNER GRADING OF ULCER WITH VAC



Table – 5 Showing wagner grading of ulcers' with VAC being applied

Variable	Total	Continuous VAC	Intermittent VAC
Wagner Grade 1	21	11 (36.7%)	10 (33.3%)
Wagner Grade 2	39	19 (63.3%)	20 (66.7%)
Total	60	30 (100.0%)	30 100.0%)

Wagner Grade 1: Among the 21 individuals categorized under Wagner Grade 1, 11 individuals (36.7%) receive Continuous VAC therapy, while 10 individuals (33.3%) receive Intermittent VAC therapy. **Wagner Grade 2:** Out of the 39 individuals classified under Wagner Grade 2, 19 individuals (63.3%) undergo Continuous VAC therapy, and 20 individuals (66.7%) receive Intermittent VAC therapy. Overall, when considering all individuals regardless of Wagner Grade, there are 30 individuals (100%) receiving Continuous VAC therapy and 30 individuals (100%) receiving Intermittent VAC therapy.

P-Value: 0.073 (Continuous) | 1.00 (Intermittent), There is no statistical significance at the $p > 0.05$ level.

DISCUSSION:

The current study compared the efficaciousness of continuous vs intermittent negative pressure wound care in the healing of diabetic leg ulcers at Meenakshi medical college hospital & research institute.

In order to decrease the bacterial burden and chronic interstitial wound fluid, boost vascularity and cytokine expression, and, to some extent, mechanically take advantage of the viscoelasticity of the periwound tissues, NPWT has been promoted as a novel approach in the healing of DFS. VAC is quickly taking the place of other wound care methods since it is usually well tolerated and has minimal side effects or contraindications. Therefore, we intended to treat and mend DFS with NPWT.

In our investigation, we found that while granulation tissue appeared early in both patient groups, a greater percentage of patients in the Intermittent VAC group reached 100% (full) granulation tissue earlier than in the Continuous VAC group. Approximately 6.7% of patients in the Intermittent VAC group and 3.3% of patients in the Continuous VAC group achieved wound closure on Day

6. Comparably, on Day 9, 33.3% of the Intermittent VAC group and 26.7% of the Continuous VAC group had wound closure. To support our findings, on Day 12, 43.3% of the patients in the Intermittent VAC group and 40% of those in the Continuous VAC group had wound closure.

Day 3 BJS showed that 6.7% of the intermittent VAC group had a range of 23 to 30, whereas 3.3% of the continuous VAC group had the same range. In a similar vein, on Day 6, BJS for the intermittent VAC group is discovered to be 26.7% as opposed to 16.7% in the continuous VAC group, indicating a quicker rate of recovery in the patients in the intermittent VAC group.

Patients in the Intermittent VAC group had lower blood culture positive rates than those in the Continuous VAC group. In contrast to the continuous VAC group, the intermittent VAC group's blood culture negative was observed early. In our study, 16.7% of participants in the continuous VAC group and nearly 20% of participants in the intermittent VAC group did not see any development. On the second and third culture reports, 53.6% and 84.2% of the intermittent group and 41.4% and 81.2% of the continuous group, respectively, showed no growth.

CONCLUSION:

Diabetic foot syndrome is the most prevalent diabetic consequence; if left untreated, it can be lethal. In addition to glycemic management, there are a plethora of effective ulcer healing methods accessible. NPWT, both intermittent and continuous, has had encouraging outcomes in previous research. In our investigation, VAC treatment was administered intermittently to patients and continuously to controls. On Day 6, the wound closure rates for the cases are 33.3%, whereas the control group's wound closure rates are 26.7%.



Therefore, we draw the conclusion that, even though VAC therapy has higher wound closure rates, the application of intermittent VAC therapy is preferred for the healing of diabetic leg ulcers due to a slightly higher proportion of wound closure rates in the intermittent VAC group as compared to the continuous VAC group.

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