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Original Article

Comparison Between the Conventional Dressing and Vaccum Assisted Dressing in Diabetic Ulcer

Dr. B. SURESH KUMAR M.S, FRCS
Associate professor, Department of general surgery, Government Vellore medical College

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Corresponding Author:

Dr. B. SURESH KUMAR

Associate professor, Department of general surgery, Government Vellore medical College

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ABSTRACT

BACKGROUND: Diabetic ulcers are a significant complication of diabetes, often leading to prolonged healing times, increased morbidity, and healthcare costs. The management of diabetic ulcers requires effective wound care strategies to promote healing and prevent complications.
OBJECTIVE: To compare the efficacy of conventional dressing versus vacuum-assisted dressing in the management of diabetic ulcers.
METHODS: A prospective Interventional study was conducted on patients with diabetic ulcers attending the Department of General Surgery, Government Vellore Medical College and Hospital, Vellore. Patients were randomly assigned to receive either conventional dressing or vacuum-assisted dressing. Wound healing parameters, including wound size reduction, granulation tissue formation, and time to complete healing, were assessed and compared between the two groups.
RESULTS: The study included 60 patients with diabetic ulcers, with 30 patients in the conventional dressing group and 30 patients in the vacuum-assisted dressing group. The results showed that vacuum-assisted dressing significantly improved wound healing parameters compared to conventional dressing ($p < 0.05$).
CONCLUSION: Vacuum-assisted dressing is a more effective wound care strategy than conventional dressing in the management of diabetic ulcers, promoting faster wound healing and reducing the risk of complications. The findings of this study suggest that vacuum-assisted dressing should be considered as a primary treatment option for diabetic ulcer.

Keywords: *Diabetic ulcers; Vacuum-assisted dressing; Conventional dressing; Negative pressure wound therapy*

INTRODUCTION

Medicine has advanced greatly over the centuries, yet chronic wound management—especially diabetic foot ulcers (DFUs)—remains a major clinical challenge. Chronic wounds affect about 1% of the global population, with over 24 million cases requiring care annually. DFUs are among the most serious complications of diabetes, affecting up to 25% of patients and contributing to around 85% of diabetes-related amputations[1,2]. Traditional saline-moistened gauze dressings often fail to provide the moist environment needed for healing, while many advanced treatments remain costly and lack consistent evidence. Negative Pressure Wound Therapy (NPWT), or Vacuum-Assisted Closure (VAC), has emerged as an effective alternative, shown in studies—including trials in India—to promote faster healing, reduce infections, and improve outcomes. With diabetes rising rapidly in India, affordable, locally developed NPWT systems may offer a practical, accessible solution for improving DFU care in resource-limited settings[3,4].

This study aims to compare the effectiveness of VAC therapy with conventional moist dressings in treating diabetic foot ulcers. The goal is to determine whether VAC can serve as a more efficient and affordable wound care option for patients with chronic diabetic wounds in the Indian healthcare context.

OBJECTIVE:

To assess and compare the rate of wound healing in patients with diabetic foot ulcers treated using conventional moist dressings versus those treated with VAC therapy.

To evaluate and compare the incidence of wound infections, complications, and adverse events associated with both treatment methods.

To analyze the time duration required for complete wound closure in each treatment group.
To perform a cost-effectiveness analysis comparing VAC therapy with conventional dressing methods, particularly in resource-limited healthcare settings.

To assess patient comfort, satisfaction, and quality of life during and after treatment with conventional and vacuum-assisted dressings.

METHODOLOGY:

Study Design

A prospective interventional study was conducted to compare the outcomes of conventional wound dressing and vacuum-assisted closure (VAC) therapy in patients with various types of ulcers.

Study Population

The study enrolled 60 patients with Diabetic foot ulcers admitted to the General Surgery Department at Government Vellore medical college.

Study period

From April 2023 to June 2025

Inclusion Criteria

Individuals with diabetic foot ulcers who have undergone stabilization and wound debridement, have well-controlled diabetes, and meet specific glycemic criteria: fasting blood sugar below 100 mg/dl, post-prandial blood sugar below 140 mg/dl, and HbA1c under 6.5%.

Exclusion Criteria

Participants was excluded if they have peripheral vascular disease, osteomyelitis, coagulation disorders, uncontrolled diabetes, or if they are younger than 18 or older than 70 years of age.

Operational Guidelines:

The study began with a preparatory phase that included securing approvals from institutional authorities and the ethics committee, ensuring continuous availability of materials for both dressing methods, and preparing data collection tools.

During the data collection phase, Patients who met the inclusion criteria were randomly assigned to either Group A (conventional dressing) or Group B (VAC therapy), with all participants undergoing surgical debridement before treatment. Conventional dressings with povidone-iodine were changed daily, whereas VAC therapy applied continuous negative pressure for 72 hours within each 5-day cycle. Wound assessments were conducted on Days 0, 5, 10, and 15, evaluating ulcer size, wound margins, granulation tissue, discharge, and slough.

Data entry was completed using Microsoft Excel and analyzed using appropriate statistical tests, including paired and unpaired t-tests for quantitative variables and Chi-square or McNemar tests for qualitative variables.

RESULTS:

Patients in the conventional dressing group had a mean age of 50.90 years with a standard deviation of 10.31, whereas the vacuum-assisted group had a slightly higher mean age of 51.77 years and a standard deviation of 10.8, indicating comparable age distribution across groups. In the conventional group, 46.6% were male and 53.4% female. In the vacuum-assisted group, 40% were male and 60% female. Both groups had slightly more females than males, with equal numbers of participants (n=30) in each group.

The average ulcer size in the conventional group was 4.78 cm (SD = 0.419), while it was 6.01 cm (SD = 0.55) in the vacuum-assisted group. The difference between the two was statistically significant ($P < 0.001$), suggesting a larger initial ulcer size in the vacuum-assisted group.

Ulcer characteristics on the day of admission-Discharge was observed in all patients (100%) in both groups. Granulation tissue was present in 40% of conventional and 30% of vacuum-assisted cases ($P = 0.416$). Indurated margins were noted in 56.6% of the conventional group and 63.3% of the vacuum-assisted group ($P = 0.598$), with no statistically significant differences.

Ulcer presentation on Day 5-Discharge was still present in 93.3% of conventional group patients, compared to 63.3% in the vacuum-assisted group, a statistically significant difference ($P = 0.004$). Ulcer size reduction was noted in 53.3% of

conventional and 50% of vacuum-assisted patients (P = 0.796). Granulation tissue was present in 73.3% and 70% of patients in the conventional and vacuum-assisted groups, respectively. Margins remained indurated in 63.3% of conventional and 46.6% of vacuum-assisted cases (P = 0.194), not statistically significant.

Ulcer findings on Day 10-Discharge was seen in 60% of the conventional group and 43.3% of the vacuum-assisted group (P = 0.196). Size reduction was significantly more in the vacuum-assisted group (66.6%) compared to conventional (36.6%) (P = 0.020). Granulation tissue was present in 80% of patients in both groups. Indurated margins were more prevalent in the conventional group (56.6%) than the vacuum-assisted group (20%) (P = 0.003), which was statistically significant (Showed In Figure 1).

Table 1 showed findings on Day 15. Discharge was present in 53.3% of conventional and only 20% of vacuum-assisted patients, a significant difference (P = 0.007). Ulcer size reduction occurred in 26.6% of conventional and 80% of vacuum-assisted cases (P = 0.001), indicating better outcomes with vacuum-assisted therapy. Granulation tissue was seen in 83.3% of conventional and 93.3% of vacuum-assisted patients. Indurated margins were more frequent in the conventional group (60%) compared to 13.3% in the vacuum-assisted group (P = 0.001), showing significant improvement in the latter.

Table1: Presentation of ulcer on the Day 15 of admission:

Variables		Conventional n(%)	Vaccum assisted n(%)	P value
Discharge day 15	Yes	16(53.3%)	6(20%)	**.007***
	No	14(46.6%)	24(80%)	
Size day 15	Reduced	8(26.6%)	24(80%)	**.001***
	Not reduced	22(73.3%)	6(20%)	
Margin day 15	Indurated	18(60%)	4(13.3%)	**.001***
	Not indurated	12(40%)	26(86.7%)	

Chi-square test *P value <0.05-statistically significant

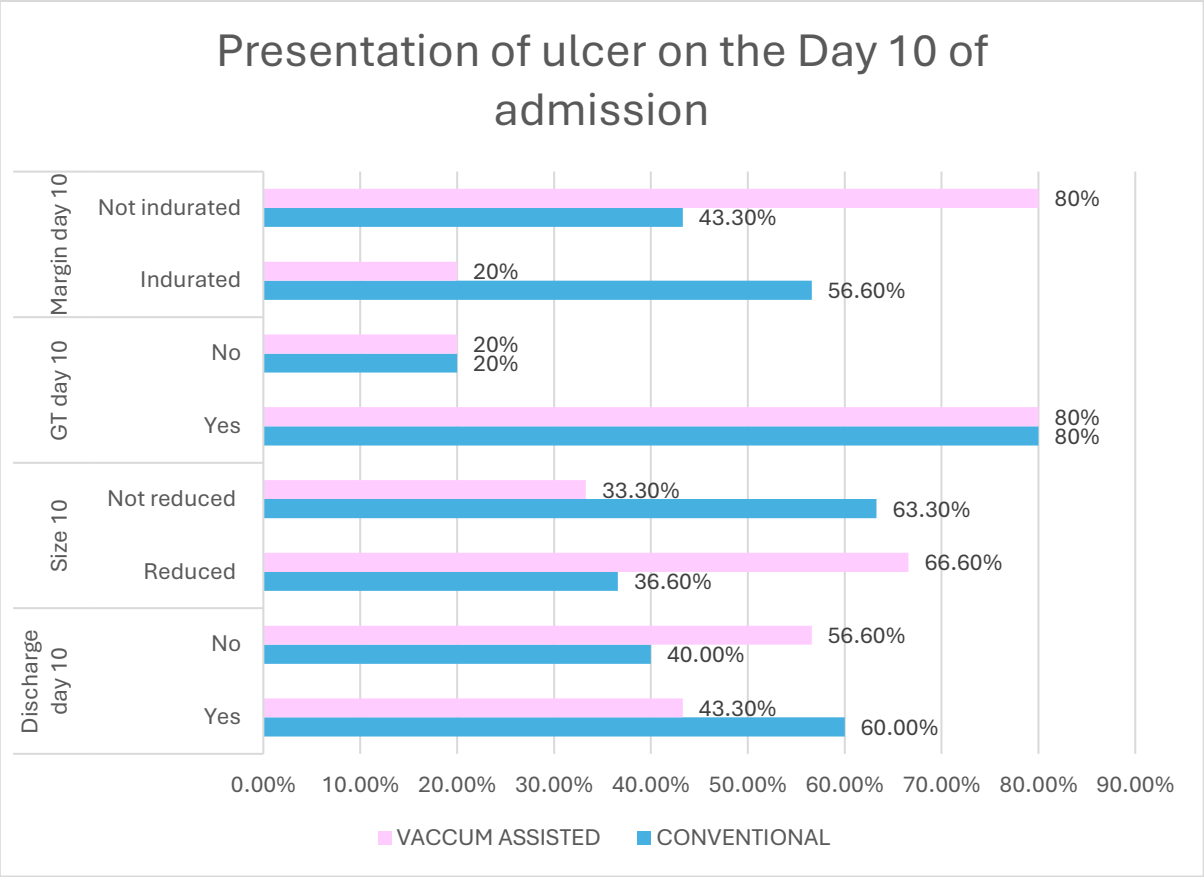

Figure: Ulcer Presentation On Day 10:

DISCUSSION

In this study of 60 patients, evenly divided between conventional and vacuum-assisted dressing groups, both groups had comparable demographic profiles, with mean ages around 51 years and a slight female predominance. By Day 15, the vacuum-assisted group showed markedly better clinical outcomes, including reduced wound discharge, greater ulcer size

reduction, more healthy granulation tissue, and a faster decrease in indurated margins compared with the conventional dressing group.

Our findings align with previous studies, including those by Singh et al. and Karanvir Singh[5] et al., which demonstrated that VAC therapy leads to faster wound size reduction, quicker granulation tissue formation, fewer debridements, and shorter hospital stays compared to conventional dressings. Consistent with this evidence, our results from Day 5 to Day 15 showed accelerated healing in the vacuum-assisted group, reinforcing VAC as a more effective and clinically advantageous method for managing complex diabetic foot wounds.

The age distribution in both groups was nearly identical, with mean ages of 50.9 years in the conventional group and 51.8 years in the VAC group, indicating well-balanced baseline characteristics and minimizing age-related bias. These findings mirror those of Raj et al. and Patra et al., who also reported comparable age profiles between VAC and conventional dressing groups. Gender distribution was similarly balanced, with roughly equal proportions of males and females in both groups, consistent with previous studies such as those by Patra et al. and Singh et al. This demographic parity strengthens the internal validity of our study and supports the reliability of subsequent clinical outcome comparisons.

On Day 0, the vacuum-assisted group had significantly larger ulcers (6.01 cm vs. 4.78 cm; $P < 0.001$), indicating that patients receiving VAC often presented with more severe wounds, unlike RCTs such as those by James et al. and Vaidhya[6] et al., where baseline ulcer sizes were comparable. Despite this, evidence—including findings from Singh[5] et al.—shows that VAC achieves greater wound contraction even in larger ulcers, consistent with our observation of accelerated healing. Baseline wound characteristics were otherwise similar: all patients had discharge, granulation tissue rates were comparable (40% vs. 30%; $P = 0.416$), and indurated margins showed no significant difference between groups. These results align with previous studies reporting similar baseline wound profiles, supporting the validity of subsequent outcome comparisons.

By Day 5, the vacuum-assisted group showed a clear early advantage, with significantly fewer patients exhibiting discharge (63.3% vs. 93.3%; $P = 0.004$), while ulcer size reduction and granulation tissue formation were similar between groups. These findings mirror reports by Singh[5] et al. and Dharaneesh et al., who also noted reduced exudate and faster wound improvement with VAC therapy by Day 5. Although both groups demonstrated comparable reductions in ulcer size and granulation rates, the marked decrease in discharge and better wound control in the VAC group indicate more effective early healing.

By Day 10, the vacuum-assisted group showed clear clinical advantages, with significantly greater ulcer size reduction (66.6% vs. 36.6%; $P = 0.020$) and markedly fewer indurated margins (20% vs. 56.6%; $P = 0.003$), while discharge rates and granulation tissue presence were similar between groups. These results align with studies by Sinha et al. and Shukla et al., which also reported superior ulcer contraction, reduced induration, and faster wound stabilization with VAC by the second week. Overall, the Day 10 findings highlight the accelerated intermediate-phase healing achieved with vacuum-assisted therapy.

By Day 15, the vacuum-assisted group showed clear clinical superiority, with significantly fewer patients having wound discharge (20% vs. 53.3%; $P = 0.007$), markedly greater ulcer size reduction (80% vs. 26.6%; $P = 0.001$), and far fewer indurated margins (13.3% vs. 60%; $P = 0.001$). Although granulation tissue formation was similar between groups, VAC clearly enhanced overall wound healing, mirroring findings from Srivastava et al. and Reddy et al., who also reported faster exudate clearance, greater wound contraction, and improved transition to the proliferative phase with negative pressure therapy.

CONCLUSION

This comparative study of 60 patients showed a clear therapeutic advantage of vacuum-assisted closure (VAC) over conventional dressing in managing chronic ulcers. Although baseline demographics and wound characteristics were similar, significant differences emerged from Day 5 onward, with the VAC group showing faster reduction in wound discharge and markedly greater improvements by Day 10 and Day 15 in ulcer size reduction and margin induration. While granulation tissue formation increased in both groups, it remained consistently higher in the VAC group. Overall, the results demonstrate that VAC therapy accelerates wound contraction, improves wound bed conditions, and offers superior healing outcomes-even in patients with larger initial ulcers-supporting its use as a more effective dressing modality.

Declaration:
Conflicts of interests: The authors declare no conflicts of interest.
Author contribution: All authors have contributed in the manuscript.
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