

## A Study of Vacuum Assisted Closure Dressing in 50 Cases of Patients of Diabetic Limb

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### Abstract

**Background:** To evaluate the effectiveness of VAC dressing for the management of diabetic limb.

**Material and Method:** The study is a prospective comparative study which was conducted on 50 patients of diabetic limb ulcers admitted in General Surgery Department at Tertiary care hospital between June 2017 to June 2019. Patients were followed up until discharged from the hospital or completion of 8 weeks assessment period from the date of admission whichever was earlier. **Result:** Ulcer due to diabetes is common in males. 4% of the patients had hba1c level between 6.5 to 9.5. In 64% of patients granulation tissue appeared at the end of 2 weeks after VAC dressing while in only 40% of patients granulation tissue appeared after 2 weeks of conventional dressing. In 80% of patients wound was completely covered by granulation tissue at the end of 4 weeks after VAC dressing while only in 52% wound was completely covered by granulation tissue after 4 weeks of conventional dressing. **Conclusion:** VAC therapy is better than conventional therapies in terms of wound healing, less complications, reducing the hospital stay, reducing the bacterial infection load and is cost effective.

**Keywords:** - VAC Therapy, diabetes, granulation tissue

### Introduction

The VAC was first investigated by Morykwas and Argenta et al. In 1997<sup>2</sup>. Their work followed on from studies of negative pressure in the past that had suggested it might improve wound healing. Early work suggested that negative pressure increased blood flows as evidenced by hyperaemia. Banwell et al<sup>3</sup> have found immediate application of the VAC following injury/debridement to produce good results from their experience with acute and traumatic wounds. Fentem and Matthews<sup>4</sup> looked at negative pressure applied to the fore arms of healthy volunteers and showed increased flows with application of negative pressure. Reduction in oedema is thought to be one of the mechanisms of action of the VAC<sup>1</sup>. Vacuum-assisted closure refers to wound dressing that uses negative pressure continuously or intermittently to the surface of the wound which is maintained by an apparatus. It also helps in wound debridement. Negative pressure removes fluid, decreases edema and increases blood flow and decreases bacterial counts. The

technique is less expensive than conventional management of complex wounds. VAC therapy is considered safer, more effective and cost-effective compared to other conventional types of dressing<sup>6</sup> and is increasingly used in the treatment of diabetic limb ulcer.

## **Material and Method**

### **Study design:**

The study is a prospective comparative study which was conducted on 50 patients of diabetic limb ulcers admitted in General Surgery Department at VS GENERAL Hospital between June 2017 to June 2019. The duration of our study was for 2 years. Patients were followed up until discharged from the hospital or completion of 8 weeks assessment period from the date of admission whichever was earlier.

Patients were randomly divided into cases & control groups:

Cases: received VAC dressing therapy

Controls: received conventional dressing methods

### **Inclusion criteria:**

- (1) Patients aged between 20-80 years
- (2) Patients having diabetic limb; either lower limb or upper limb

### **Exclusion criteria:**

- (1) Patients aged less than 20 years or more than 80 years
- (2) Patients who are non-diabetic
- (3) Patients having osteomyelitis
- (4) Patients having more than one limb involved
- (5) Patients who are not willing to participate in the study

### **Data analysis:**

The data of the study was analysed and results were prepared using student's paired or unpaired t-test.

### **Technical description:**

Patients in study group were applied VAC dressing while patients in control group were treated with conventional dressing methods e.g. Povidone iodine + Hydrogen peroxide, Normal saline etc. VAC dressing was applied for 48 hours with intermittent negative pressure application. VAC cycles were repeated as & when required according to patient's wound condition. Conventional dressing was done using betadine &/or hydrogen peroxide or with normal saline as & when required according to patient's wound condition. Conventional dressing was done once a day or twice a day according to condition of the wound. Wound culture & sensitivity report: Swabs for cultures were applied to the floor of the ulcer and sent for culture & sensitivity. Once a week swabs for culture & sensitivity were sent. Standard antibiotics were administered according to culture sensitivity report to all the patients. Reduction in infection load of the wound:

It was defined as % of patients' positive swab-cs reports subsequently converting into no growth. Appearance of Healthy granulation tissue & 100% coverage by Healthy granulation tissue of the wound. Ulcers were treated until wound was covered completely with healthy granulation tissue. Appearance of healthy granulation tissue was defined as appearance of red, healthy granulation tissue at any point over the floor of the ulcer. 100% coverage by healthy granulation tissue means whole of the floor of the ulcer was covered with red, healthy granulation tissue

### **Complications:**

Pain

Persistent discharge from the wound

Bleeding from the wound

Sepsis

### **Treatment outcome:**

Final treatment outcome was considered in terms of:

Putting Split Thickness Graft over healed ulcer

Re-Debridement

Amputation

Patients took discharge with raw area and were advised to follow up in OPD for regular dressing

**Duration of hospital stay:** It was defined as the duration between the date of admission and the date of discharge from the hospital.

## Results

A prospective comparative study was conducted involving 50 patients of diabetic limbs admitted under Department of General Surgery at our hospital between June 2017 to June 2019.

**Table 1: Age distribution**

Age of patients	No. of patients	Percentage (%)
21-30	1	2%
31-40	2	4%
41-50	7	14%
51-60	14	28%
61-70	17	34%
71-80	9	18%
Total	50	100%

Most of the patients (80%) admitted with diabetic limb were above the age 50 years.

**Table 2: Sex distribution**

Sex distribution	No. of cases	Percentage(%)
Males	34	68%
Females	16	32%

Males are more affected than females

**Table 3: Distribution according to location of wounds**

Location	No. of patients	(%)
Lower limb	46	92%
Upper limb	4	8%

Lower limb is more affected than upper limb

**Table 4: HbA<sub>1c</sub> Level**

HbA <sub>1c</sub> range	No. of patients	Percentage(%)
6.5-8.0	19	38%
8.1-9.5	13	26%
9.6-11.0	7	14%
11.1-12.5	5	10%
12.6-14.0	4	8%
>14.0	2	4%

Most of the patients have HBA<sub>1C</sub> in range of 6.5-9.0

**Table 5: Complications**

Complications	No. of Cases	(%)	No. of Controls	(%)
Bleeding	1	4%	2	8%
Persistent wound Discharge	1	4%	4	16%
Pain	3	12%	9	36%
Sepsis	0	0%	2	8%

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Most common complication is pain followed by persistent wound drainage

**Table 6: Treating Outcome**

Outcome	Cases	%	Controls	%
STG	19	76	13	52%
Resuturing of Wound	2	8	2	8%
Amputation	0	0	2	89%
Redebridement	1	4	3	12%
Discharge With Raw Area	3	12	5	20%

Most patients need amputation as the final treatment

## Discussion

A prospective comparative diabetic limbs admitted under Department of surgery between June 2017 to June 2019. Out of total patients admitted with diabetic limb 68% were males while 32% were females. This is comparable to study conducted by James et al<sup>9</sup> which shows mean age of patients with diabetic limb 54.37 years. This shows that middle and old aged patients with long duration of diabetes are more prone to diabetic limb. 92% of the patients had presented with lower limb wounds whereas patients had upper limb wounds. To compare with, in study conducted by Arjun et al<sup>10</sup> 98% of the patients presented with diabetic foot while only 2% of the patients presented with diabetic upper limb lesions. 64% of the patients had HbA1C level between 6.5 to 9.5. Swab culture & sensitivity report was sent at the point of appearance of healthy granulation tissue over the ulcer in every patient. In 64% of patients granulation tissue appeared at the end of 2 weeks after VAC dressing while in only 40% of patients granulation tissue appeared after 2 weeks of conventional dressing. In 80% of patients wound was completely covered by granulation tissue at the end of 4 weeks after VAC dressing while only in 52% wound was completely covered by granulation tissue after 4 weeks of conventional dressing<sup>8</sup>.

When both the data compared using student's paired t-test, p-value was <0.05 which shows that difference in rate of conversion of positive culture into negative culture is significant in VAC dressing compared to conventional dressing. According to study, only 20% of the patients with VAC therapy had any sorts of complications while 68% of the patients undergoing conventional dressing had some sort of complications like bleeding, pain, wound discharges and sepsis. Average duration of stay in hospital in our study was 28 days for the patients undergone VAC dressing while it was 36 days for patients with conventional dressings. P-value was calculated comparing both these data by student's unpaired t-test which was <0.05 which shows that difference between appearance of healthy granulation tissue between patients undergoing VAC dressing and patients having conventional dressing is significant. In patients undergoing VAC therapy, out of 25 patients, 19 patients had been discharged after doing STG, 3 patients were discharged with ulcer not healed completely, 2 patients were discharged after re-suturing the wound and only 1 patient had to undergo redebridement. Patients who had conventional dressings applied, out of 25 patients, 14 patients were discharged after STG, 2 patients had to undergo amputation, 3 patients had to undergo redebridement, 2 patients were discharged after resuturing the wound and 4 patients took discharge with ulcer not completely healed.

## Conclusion

In our prospective comparative study, we included 50 patients of diabetic limb and did evaluation of VAC dressing by comparing it to conventional methods of dressing. We analysed and evaluated the VAC therapy by comparing different factors like time duration for appearance of healthy granulation tissue & time taken by the healthy granulation tissue to cover the wound completely, reduction in infection load in wound, rate of complications, average duration of stay in hospital and the final treatment outcome with conventional dressing methods. In VAC therapy, appearance of healthy granulation tissue appeared earlier as compared to that in conventional wound healing<sup>9</sup>. Also, in VAC

therapy complete coverage of wound by healthy granulation tissue occurs earlier than in conventional dressing methods<sup>9</sup>. VAC dressing reduces the bacterial infection load significantly than conventional dressing methods. Because of above reasons in our study, VAC dressing also decreases the duration of hospital stay for the patient which is very important in terms of reducing patient morbidity. From present study, we can conclude that VAC is very promising method for the ulcer wound therapy and it should be applied more frequently wherever it can be, to benefit the patients and health care system. In our study, there are less number of patients so sample size is small therefore the results need to be verified by conducting further studies. There is lack of high quality studies on VAC therapy which shows proven clear-cut advantages and disadvantages of the VAC therapy. But whatever studies have been conducted so far, most of them show VAC therapy to be superior than the conventional methods used so far for the ulcer wound management.

So, we can conclude that VAC therapy is superior than conventional dressing methods in many aspects and it should be applied in clinical practice wherever possible .<sup>6,7</sup>

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