

ORIGINAL RESEARCH

Assessment and Comparison of Efficacy of Vacuum Assisted Closure and Conventional Dressings in the Management of Infected Wounds

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ABSTRACT:

Background: Acute and chronic wounds and are a major cause of morbidity and impaired quality of life. The present study was conducted to assess the efficacy of vacuum assisted closure dressings as compared to conventional moist wound dressings in improving the healing process in chronic wounds and to prove that negative pressure dressings can be used as a much better treatment option in the management of chronic wounds. **Materials & methods:** The present study was carried out with following two groups of 30 patients each: **Group A:** Patients treated with Vacuum Assisted Closure (VAC), **Group B:** Patients treated with conventional dressings. The wounds were reassessed at the end of the fifth postoperative day and the following parameters were accounted for. They were, -Skin graft takes up as a percentage of ulcer surface area -Number of days of hospitalization. All the results were analysed by SPSS software. **Results:** There was significant difference between the groups as per Student t-test. The mean percentage of granulation tissue formation in Group A was 78.8 ± 19.07 and in Group B was 50.3 ± 25.65 , which is found to be statistically significant ($p < 0.05$). 4 (13.3%) and 2 (6.7%) patients in Group A and Group B respectively had no pain after 4 weeks of treatment whereas 8 and 3 patients respectively had mild pain. 12 and 14 patients had moderate pain while 6 and 11 patients from Group A and Group B respectively had severe pain. There was no significant difference between the groups as per Chi-Square test ($p > 0.05$). **Conclusion:** Vacuum dressing is more efficient than the normal conventional dressings. Thus, vacuum assisted closure dressing can be considered as a superior option in the management of infected wounds.

Key words: Infected, Vacuum, Wound

Received: 14 February, 2019

Revised: 24 February, 2019

Accepted: 27 February, 2019

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This article may be cited as: Gupta V, Kaur J. Assessment and Comparison of Efficacy of Vacuum Assisted Closure and Conventional Dressings in the Management of Infected Wounds. Int J Res Health Allied Sci 2019; 5(2):51-54.

INTRODUCTION

Acute and chronic wounds and are a major cause of morbidity and impaired quality of life. They affect at least 1% of the population and represent a significant risk factor for hospitalization, amputation, sepsis, and even death. The treatment of large wounds remains a significant challenge to practitioners, a cause of pain and discomfort to the patients, and costly.^{1,2}

During an ideal wound care in addition to control the infection should also protect the normal tissues and must not interfere with the normal wound healing. Various treatment modalities have been discovered over the years in forms of different types of wound dressings like creams, ointments, solutions while other classes of wound dressings are occlusive dressing, non-occlusive dressing, absorptive dressing, skin substitutes, and negative suction vacuum dressing.^{3,4}

The present study was conducted to assess the efficacy of vacuum assisted closure dressings as compared to conventional moist wound dressings in improving the healing process in chronic wounds and to prove that negative pressure dressings can be used as a much better treatment option in the management of chronic wounds.

Hence the present study was done at our tertiary care centre to compare and evaluate the efficiency of vacuum assisted closure and conventional dressings in the management of infected wounds.

MATERIALS & METHODS

A hospital based prospective observational study was conducted to compare vacuum assisted closure with conventional dressings in the management of infected wounds. The present study was carried out with following two groups of 30 patients each:

- **Group A:** Patients treated with Vacuum Assisted Closure (VAC)
- **Group B:** Patients treated with conventional dressings

The wounds were compared based on the following parameters. They are, - Rate of granulation tissue formation as percentage of the ulcer surface area - Quality of ulcer bed Present dimensions and surface area of the ulcer Once these parameters were assessed, both the groups were subjected to split thickness skin grafting. Both groups were given the same systemic antibiotics during the postoperative period. The wounds were reassessed at the end of the fifth postoperative day and the following parameters were accounted for. They were, -Skin graft take up as a percentage of ulcer surface area - Number of days of hospitalization After discharge, patients were followed up in the outpatient department after one month to assess post skin grafting complications like contractures, itching, pain and infection. The VAS for pain consists of a 10cm line with two end-points representing 'no pain' and 'pain as bad as it could possibly be'. Patients were asked to rate their pain by placing a mark on the line corresponding to their current level of pain. The distance along the line from the 'no pain' marker is then measured with a ruler giving a pain score out of 10. All the results were analysed by SPSS software. Chi- square test was used for assessment of level of significance.

RESULTS

Majority of the patients in Group A were in the age group of 41-50 years (26.7%) followed by 51-60 years (23.3%), 61-70 years (16.7%), 31-40 (16.7%), 21-30 years (13.3%), 12-20 years (6.7%) and 71-75 years (3.3%). The mean age of the patients was 47.1 ± 14.68 years. Majority of the patients in Group B were in the age group of 41-50 years (30%) followed by 61-70 years (26.7%), 51-60 years (20%), 31-40 years (13.3%), 21-30 years (6.7%) 12-20 years (3.3%) and 71-75 years (3.3%). The mean age of the patients was 48.8 ± 13.02 years. There was no significant difference between the groups as per Student

t-test (p>0.05). The initial wound area was comparable between both the groups (163.4±13.66 vs. 156.7±14.45cm²) and there was significant shrinkage in wound area in both the groups. The shrinkage of wound area was significantly more in Group A as compared to Group B (86.6±6.59 vs. 125.9±15.28 cm²). Healing was achieved in minimum of 10 days and maximum of 45 days in Group A and minimum of 21 days and maximum of 56 days in Group B. The mean duration of wound healing in Group A and Group B was 27.6 ± 9.42 and 41.2 ± 10.75 days respectively. There was significant difference between the groups as per Student t-test. The duration of hospital stay was minimum of 12 days and maximum of 48 days in Group A and minimum of 22 days and maximum of 58 days in Group B. The mean duration of wound healing in Group A and Group B was 29.1 ± 9.08 and 41.5 ± 10.98 days respectively. There was significant difference between the groups as per Student t-test (p<0.05). The mean graft uptake of Group A and Group B was 82.6 ± 15.59 and 70.9 ± 18.84 respectively. There was significant difference between the groups as per Student t-test (p<0.05). 2 (6.7%) patients in Group A had 5-35% of granulation tissue fill up while 6 (20%) and 22 (73.3%) patients had 35-65% and 65-95% of granulation tissue fill up respectively. In Group B, 12 (40%) patients had 5-35% of granulation tissue fill up, 8 (26.7%) patients had 35-65% of granulation tissue fill up and 10 (33.3%) patients had 65-95% of granulation tissue fill up. The mean percentage of granulation tissue formation in Group A was 78.8 ± 19.07 and in Group B was 50.3 ± 25.65, which is found to be statistically significant (p<0.05). 4 (13.3%) and 2 (6.7%) patients in Group A and Group B respectively had no pain after 4 weeks of treatment whereas 8 and 3 patients respectively had mild pain. 12 and 14 patients had moderate pain while 6 and 11 patients from Group A and Group B respectively had severe pain. There was no significant difference between the groups as per Chi-Square test (p>0.05).

Table 1: Distribution of patients according to Duration of Wound Healing (days)

Duration of Wound Healing (days)	Group A		Group B		p Value
	N	%	N	%	
10-20	6	20%	0	-	<0.05
21-30	14	46.7%	7	23.3%	
31-40	7	23.3%	5	16.7%	
41-50	3	10%	11	36.7%	
51-60	0	-	7	23.3%	
Total	30	100%	30	100%	
Mean±SD	27.6 ± 9.42		41.2 ± 10.75		

Table 2: Distribution of patients according to Duration of Hospital Stay

Duration of Hospital Stay	Group A		Group B		p Value
	N	%	N	%	
11-20	4	13.3%	0	-	<0.05
21-30	15	50%	7	23.3%	
31-40	7	23.4%	5	16.7%	
41-50	4	13.3%	11	36.7%	
51-60	0	-	7	23.3%	
Total	30	100%	30	100%	

Mean±SD	29.1 ± 9.08	41.5 ± 10.98
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Table 3: Distribution of patients according to % of Graft Take up

% of Graft Take up	Group A		Group B		p Value
	N	%	N	%	
91-100%	14	46.6%	5	16.7%	<0.05
81-90%	3	10%	6	20%	
71-80%	8	26.7%	3	10%	
61-70%	2	6.7%	9	30%	
51-60%	2	6.7%	1	3.3%	
41-50%	0	-	5	16.7%	
31-40%	1	3.3%	1	3.3%	
Total	30	100%	30	100%	
Mean±SD	82.6 ± 15.59		70.9 ± 18.84		

Table 4: Comparison of Granulation tissue fill-up % between groups

Granulation fill-up (%)	Group A		Group B		p Value
	N	%	N	%	
5-35%	2	6.7%	12	40%	<0.05
35-65%	6	20%	8	26.7%	
65-95%	22	73.3%	10	33.3%	
Total	30	100%	30	100%	
Mean ± SD	78.8 ± 19.07		50.3 ± 25.65		

Table 5: Distribution of patients according to VAS Score

VAS Score	Group A		Group B		p Value
	N	%	N	%	
0 – No Pain	4	13.3%	2	6.7%	>0.05
1 to 3 - Mild Pain	8	26.7%	3	10%	
4 to 7 – Moderate Pain	12	40%	14	46.6%	
8 to 10 – Severe Pain	6	20%	11	36.7%	
Total	30	100%	30	100%	

DISCUSSION

In the present study, majority of the patients in Group A were in the age group of 41-50 years (26.7%) followed by 51-60 years (23.3%), 61-70 years (16.7%), 31-40 (16.7%), 21-30 years (13.3%), 12-20 years (6.7%) and 71-75 years (3.3%). The mean age of the patients was 47.1 ± 14.68 years. Majority of the patients in Group B were in the age group of 41-50 years (30%) followed by 61-70 years (26.7%), 51-60 years (20%), 31-40 years (13.3%), 21-30 years (6.7%) 12-20 years (3.3%) and 71-75 years (3.3%). The mean age of the patients was 48.8 ± 13.02 years. There was no significant difference between the groups as per Student t-test (p>0.05).

In our study, there was male preponderance in both the groups (56.7% and 60% respectively) while there was 43.3% and 40% female patients in Group A and Group B respectively. There was no significant difference between the groups as per Fisher test (p>0.05). This is similar to the studies of Richhariya A *et al.*⁸, Siddha LV *et al.*⁹, Chandrashekar S *et al.*¹⁰ and Koppad SN *et al.*¹¹

Richhariya A *et al.*⁸ study evaluating the efficacy of Negative Pressure Wound Therapy compared with the Saline Moist Gauze Dressing found mean patient population age was 38 years and the patients were predominantly male (69.2%).

Siddha LV *et al.*⁹ prospective non-randomized comparative study evaluating the efficacy of the modified method of vacuum dressing in wound healing in low resource settings found mean age in the experimental group were 45.39 ± 9.95 and in control group 46.72 ±

7.63 and sex distribution in experimental group were 34 patients (82.9%) males and 7 patients (17%) females, in control group 41 patients (82%) males and 9 patients (18%) females.

Chandrashekar S *et al.*¹⁰ prospective comparative study evaluating the efficacy of topical negative pressure dressing in comparison with conventional moist wound dressings in wound healing found age of the patients ranged between 30 and 75 years. The mean age of the patients in study group was 61.33±7.63years and in control group was 55.40±11.54years. The age distribution was comparable and statistically insignificant in both groups. In study group, 80% were males and 20% were females. In control group 86.67% were males and 13.33% were females.

Koppad SN *et al.*¹¹ prospective randomized observational study evaluating the efficacy of topical negative pressure dressing with conventional moist wound dressings in healing of wounds found age ranged from 9-70 years in study group and 24-75 years were from control group. 34% were in the age group of 51-60 years, of this 36% were in the study group and 32% were in the control group. Maximum number of cases (64%) belonged to the age group of above 41 years. The mean age of study group was 43.56±17.94 years and the mean age of control group was 49.60±14.90 years. 28 % were females in the study group and 20 % were females in control group.

In our study, healing was achieved in minimum of 10 days and maximum of 45 days in Group A and

minimum of 21 days and maximum of 56 days in Group B. The mean duration of wound healing in Group A and Group B was 27.6 ± 9.42 and 41.2 ± 10.75 days respectively. There was significant difference between the groups as per Student t-test ($p < 0.05$).

The duration of hospital stay was minimum of 12 days and maximum of 48 days in Group A and minimum of 22 days and maximum of 58 days in Group B. The mean duration of wound healing in Group A and Group B was 29.1 ± 9.08 and 41.5 ± 10.98 days respectively. There was significant difference between the groups as per Student t-test ($p < 0.05$). This is in concordance to the studies of Koppad SN *et al.*¹¹ and Richhariya A *et al.*⁸

Nagaraj S *et al.*¹² study assessing the feasibility and efficacy of Topical Negative Pressure (TNP) dressing using a locally constructed TNP device and comparing it with regular gauze dressings for large wounds reported average duration of hospital stay was minimum of TNP Dressing was 28.21 days and in Conventional Dressing was 37.28 days.

Koppad SN *et al.*¹¹ prospective randomized observational study evaluating the efficacy of topical negative pressure dressing with conventional moist wound dressings in healing of wounds reported mean duration of number of days of hospital stay in the study group is 42.36 ± 13.78 and 46.76 ± 28.36 in the control group.

Richhariya A *et al.*⁸ study evaluating the efficacy of Negative Pressure Wound Therapy compared with the Saline Moist Gauze Dressing reported time that elapsed between initial debridement and appearance of granulation, wound closure and total duration of hospital stay was significantly ($P < 0.001$) shorter in the NPWT group than in the conventional dressing group.

CONCLUSION

Under the light of above obtained data, the authors conclude that vacuum dressing is more efficient than the normal conventional dressings. Thus, vacuum assisted closure dressing can be considered as a superior option in the management of infected wounds.

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