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A COMPARATIVE STUDY ON THE ROLE OF RETROGRADE VENOUS PERFUSION THERAPY AND INDIGENOUS NEGATIVE PRESSURE WOUND THERAPY AFTER INNOVATIVE HYDRO DEBRIDEMENT IN THE TREATMENT OF DIABETIC ULCER FOOT

Medicine

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ABSTRACT

Background: Diabetic foot is a disease that includes infections, ulcerations, and loss of deep tissue. In addition, there may be a link with neurological, peripheral vascular, and metabolic disorders. In this study, we sought to compare the effectiveness of retrograde venous perfusion therapy with traditional negative pressure wound therapy for the treatment of diabetic foot ulcers. **Materials And Methods:** This prospective analytical study was carried out on 100 patients (50 in study group, 50 in control group) with diabetic foot ulcers from January 2020 to January 2021. Patients were classified according to Wagner's classification of ulcers (Grade 0, Grade 1, Grade 2) in both genders presenting with diabetic foot. **Result:** 100 patients between the ages of 40 and 69 were included in the study. The mean age of negative pressure therapy was 54.22, whereas that of RVP therapy was 48.24. Both negative pressure therapy and RVP therapy had more patients with grade 1 diabetic foot ulcers. The difference in the mean ulcer surface area between the groups ($p = 0.737$) was not significant. There was a significant difference in granulation tissue formation, SSG% uptake (mean graft uptake), and length of hospital stay between the groups ($p < 0.001$). The percentage of amputation in RVP therapy is zero, whereas that of patients with systemic antibiotic therapy is 8%. **Conclusion:** Compared with indigenous negative pressure wound therapy, retrograde venous therapy is more effective. Advantages include better granulation, increased take of SSG, reduced hospital stay, and fewer amputations.

KEYWORDS

Diabetic foot, negative pressure therapy, retrograde venous therapy

INTRODUCTION

Diabetes mellitus has turned out to be a deadly disease in the current world these days. It's been envisioned that by 2030, there might be 366 million diabetics worldwide. That is partially because of longer life expectancy and adjustments in dietary behaviour [1–3]. With this contemporary trend, in the future, India could have the largest range of diabetics. Approximately 15% of these patients have foot issues. One percent of these patients can also drop a limb. [4-6] In India, neuropathic-infective foot is more popular when compared with ischaemic-infective foot. [7] Diabetic foot disease is characterised by neuropathy, ischemia, and infection. The foot of a diabetic patient has the chance of pathologic outcomes, which include infection, ulceration, or destruction of deep tissues associated with neurologic abnormalities, diverse ranges of peripheral vascular disease, and/or metabolic headaches of diabetes inside the deceased limb [9, 10]. Currently, normal foot examinations and monitoring are not robotically completed. The habitual practice is "no court cases, no exam." Hence, by the point the patient comes with complaints, the pathology is normally advanced and the foot is past salvage. [8] This study aims to investigate the outcomes and blessings of retrograde venous perfusion remedy over Indigenous terrible pressure wound therapy after progressive hydrodebridement in treating diabetic foot ulcers in Madurai.

MATERIALS AND METHODS

This prospective analytical study was conducted on 100 patients with foot ulcers at Govt. Rajaji Hospital, Madurai, between January 2020 and January 2021.

Inclusion Criteria

Patients of more than 25 years of age of both genders presenting with diabetic ulcers with Wagner's classification of grades 0, 1, and 2 were included.

Exclusion Criteria: Patients less than 25 years of age, osteomyelitis, patients who did not give consent to inclusion, and arterial and venous Doppler studies with abnormal findings were excluded.

Method: One hundred patients were divided into two equal and comparable groups.

Retrograde Venous Perfusion Therapy

patients who underwent retrograde venous perfusion therapy had been classified under study, and those who underwent indigenous negative pressure wound therapy had been classified as controls. After assessment, the affected areas were photographed. PUS culture and sensitivity were determined based on the antibiotics used. RVP with IV antibiotics (for instance, cefotaxime (1 g), gentamycin (80 mg), heparin (2500 units), and 2% lignocaine with adrenaline 0.4 ml in one hundred ml of normal saline) ought to be administered intravenously to the affected limb each day for upto six days. Images were taken, six doses were given after one week, and a picture of the affected limb was taken. If required, any other course of the same therapy was administered after six weeks, and sensitivity to lignocaine was assessed. The patient was placed in the supine position. The affected limb was elevated for 5 minutes to drain the veins, and then a sphygmomanometer cuff was applied to the thigh. The pressure applied was about 20 mmHg below the systolic pressure, which influences the venous flow but maintains the arterial flow to the distal component. The combination of drugs was infused retrogradely at the proper pressure. After 20 minutes, the cuff was released. The ulcer surface region was measured twice using butter paper. Graft uptake was assessed at the end of POD 5 as a percent of ulcer surface area. The patient's quality of lifestyle in each group has been assessed by using the evaluation of total clinic stay as the number of days of hospital admission. The primary postoperative parameters noted in each group have been wound size, contracture, pain, and contamination. The final results are based totally on a reduction in wound size, amount of exudate, and recovery time and are derived from NPWT and dressing techniques.

Hydrodebridement With Negative Pressure Wound Therapy

This refers to using an excessive-pressure water jet placed parallel to the floor of the wound capable of tangentially excising soft tissues at variable strengths. It works primarily based on the Venturi effect, a unique case of Bernoulli's precept, which says that a fluid flowing through a tube that includes a constriction ought to increase the velocity to decrease the pressure and maintain conservation. of energy.This procedure simplifies the technique of debridement by employing selectively casting off slough and debris and, hence, decreasing the bacterial growth within the infected wounds. NPWT is a perfect technique for dealing with an open wound by submitting the wound to both intermittent and continuous subatmospheric pressure.

FOAM-based. technique: here, a foam cut in the shape of the ulcer is placed over the wound and sealed in the region using an adhesive film drape and a TRAC (therapeutic regulated accurate care) system. A plastic tube connects the dressing to the console, which creates the suction impact.



RESULTS

Among the 100 patients, the majority of the 100 patients were within the age group of 40-69 years in both groups. In the NPWT therapy group, 29 patients were in grade 1, and 21 were in grade 2. In the RVP therapy group, 26 patients had grade 1, and 23 had grade 2 [Table 1].

			Wagner's Classification		Total	P Valve
			Grade 1	Grade 2		
Group	Npt	Count	29	21	50	0.621
		%	58.0%	42.0%	100%	
	Rvp	Count	26	23	49	
		%	53.1%	46.9%	100%	
Total		Count	55	44	99	
		%	55.6%	44.4%	100%	

The mean age of the NPWT therapy group was 54.22, and that of the RVP therapy group was 48.24. There was no significant difference in age between the groups (p = 0.735).

The mean ulcer surface area was 38.72 cm2 ± 8.24 SD with NPWT therapy and 39.29 cm2 ± 8.64 SD with RVP therapy. The groups showed no significant differences in the ulcer surface area (p = 0.737) [Table 2]

Group		Mean	Std Deviation	P Valve
Ulcer Area	Npt	38.72	8.24	0.737
	Rvp	39.29	8.64	

The mean granulation tissue formation in the NPWT therapy group was 34.74 cm2 ± 6.72 (SD) of the total ulcer surface area, whereas that in the RVP therapy group was 41.44 ± 4.34 (SD). There was a significant difference in granulation tissue formation between groups (p <0.001) [Tabe 3]

Group		Mean	Std Deviation	P Valve
Granulation Area	Npt	34.74	6.72	<0.0001
	Rvp	41.44	4.34	

The mean graft uptake in the NPWT and RVP therapy groups was 66.02% ± 16.94 (SD) and 85.36% ± 12.40 (SD), respectively. There was a significant difference in SSG% uptake between the groups (p<0.001) [Table 4]

Group		Mean	Std Deviation	P Valve
Ssg Uptake	Npt	66.02	16.94	<0.0001
	Rvp	85.36	12.40	

There was a significant difference in the length of hospital stay between groups (p<0.001). Wound improvement in NPW therapy was only 92%, whereas in RVP therapy, it was approximately 100% [Table 5]

			Hospital Stay		Total	P Valve
			<30	>30		
Group	Npt	Count	26	24	50	<0.0001
		%	52.0%	48.0%	100.0%	
	Rvp	Count	44	5	49	
		%	89.8%	10.2%	100.0%	
Total		Count	70	29	99	
		%	70.7%	29.3%	100%	

The percentage of amputation in RVP therapy was zero compared with that in NPW therapy (8%). The postoperative wound size, contracture, pain, and infection were lower in the study group than in the control group [Table 6]

			Amputation		Total	P Valve
			No	Yes		
Group	Npt	Count	46	4	50	0.043
		%	92%	8%	100%	
	Rvp	Count	49	0	49	
		%	100%	0%	100%	
Total		Count	95	4	99	
		%	96%	4%	100%	

DISCUSSION

Diabetic foot ulcers (DFUs) are a severe and challenging problem of diabetes mellitus, regularly leading to tremendous morbidity and potential amputations if no longer managed efficiently. [11] Commonly situated on the underside of the foot, a foot ulcer can lead to hospitalisation in six percent of instances, generally because of infection or complications associated with the ulcer. [12]

RVPT is a novel therapeutic method targeted at improving blood perfusion within the affected limb by focusing on the venous gadget. Concurrently, NPW therapy has been a cornerstone in coping with DFUs, addressing the infectious component that frequently accompanies these wounds. [13] In our study, the age groups of both the observed and control corporations have been between 40 and 69 years, and the mean ages of each group (NPW and RVP) were 54.22 and 48.24, respectively. Furthermore, numerous studies have stated no significant difference in age or gender among the groups [14–16].

In our study, the mean ulcer surface area turned out to be higher in the RVP group than in the NPW therapy group. Still, the surface area had no statistically significant differences (p = 0.737). Wang et al. found no vast variations in the size or vicinity of the ulcers among the groups. [14] Larijani et al. additionally pronounced a trifling difference in the surface location of ulcers among the treatment and management groups. [17] In our study, the mean granulation tissue formation in the NPW therapy group turned into 34.74 cm2 ± 6.72 (SD) of the total ulcer surface area, while that inside the RVP therapy group turned into 41.44 ± 4.34 (SD), displaying a significant difference between the groups (p <0.001). The mean graft uptake within the NPWT and RVP therapy groups is 66.02% ± 16.94 (SD) and 85.36% ± 12.40 (SD), respectively.

A study by Jayalal et al. mentioned a significant distinction in the mean granulation tissue formation between the study and the control group [16]. Similarly, Tauro et al. determined that the average rate of granulation tissue formation in the study group changed to 87.94% ± 7.33 (SD) of the total ulcer surface area. In assessment, within the control group, it was 74.64% ± 8.04 (SD) of the total ulcer surface area, which is a significant distinction (p<0.001).

The average graft take up in the study group was 92.31% ± 3.94 (SD); at the same time, in the control group, it was 86.15% ± 6.93 (SD). This difference is statistically significant, with a p-value of <0.001. In our study, there was a significant difference in the length of hospital stay between groups (p<0.001). 100% of wound improvement was found in RVP therapy as compared to NPW therapy. This result is similar to that of the study by Seidel et al., who reported that RVP therapy had seven days of hospitalisation, while NPW was better in systemic therapy. In contrast to systemic antibiotic therapy, no non-responders were found with RVP therapy [19].

Jayalal et al. stated that patients' hospital stays in the control group were appreciably longer than inside the study group. While the mean duration of stay for the study group was 19 days, the control group's mean period of stay changed to 25 days. [16] In our study, the percentage of amputation in RVP therapy changed to zero as compared with that during NPW therapy (8%).

The postoperative wound size, contracture, pain, and infection have decreased in the study group compared to the control group. A similar

study by Seidel et al. suggested that no patient had undergone toe amputation with RVP therapy, which turned into 25% with systemic antibiotic therapy [20]. This study became similar to the study by Jina et al., who suggested that gangrene or pre-gangrene was prevented in most patients.

CONCLUSION:

In conclusion, retrograde venous therapy has considerable advantages over NPW therapy. RVP therapy has validated a significant reduction in ulcer size, advanced granulation tissue formation, greater SSG uptake, a reduced hospital stay period, and a decreased incidence of amputation.

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