A COMPARATIVE STUDY BETWEEN CONVENTIONAL AND COLLAGEN DRESSING IN THE HEALING OF FOOT ULCERS

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ABSTRACT

BACKGROUND

Foot ulcer is a major disease-causing disability to many patients around the world. Treatment of foot ulcer remains a major healthcare issue; and especially diabetic foot ulcer accounts for 15% of incidence which is the commonest cause of lower extremity amputation accounts for. Effective treatment of ulceration is necessary to reduce the number of amputations as emphasized by St. Vincent's declaration. Therefore, evaluation of the effect of the collagen dressing on various types of foot ulcers is undertaken.

The aim of the study was to analyse the role of collagen dressing in healing of these ulcers in comparison with the conventional wound dressings.

This cross-sectional study of 100 patients was conducted over a period of 6 months in the Department of General Surgery, Kilpauk Medical College, Chennai, India. Conventional and collagen dressing were compared in patients with foot ulcers and the healing outcome was evaluated.

MATERIALS AND METHODS

This study was conducted over a period of 6 months in the Department of General Surgery, Kilpauk Medical College, Chennai, India. 100 patients suffering from foot ulcers were divided into two groups based on dressing applied. Group A consists of patients with collagen dressing and Group B, of patients with conventional dressing.

RESULTS

Collagen dressing increases the rate of wound healing as compared to moistened gauze. It also reduces the requirement of skin cover. Further, it also reduces the follow up period and antibiotic use significantly as compared to conventional dressing.

CONCLUSION

Collagen dressing is significantly better than conventional dressing for faster healing and reducing the complications rates without causing any significant morbidity to the patient.

KEYWORDS

Ulcer, Diabetic, Collagen Dressing.

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BACKGROUND

Chronic ulcer disease[1] is the major disease-causing disability. Chronic foot ulcers[1,2] are defined as slow and non-healing discontinuity of epidermal and dermal tissues on the lower limb which last more than 6 weeks.[3] The maximum number of the ulcers are associated with venous disorders, peripheral arterial disorders, mixed arterio-venous disorders and diabetes mellitus. The nutrition[3] of the patient also plays an important role in healing like anaemia, hypoalbuminaemia, malnutrition, immunosuppression and malignancy,[4] all affect proper healing and leading to prolonged phases of healing.[5]

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Diabetic foot ulcers are caused by a variety of factors, in particular peripheral vascular diseases with or without loss of sensations due to peripheral neuropathy.[6] These foot ulceration can promote more serious morbidity leading to eventual loss of limb. In diabetic ulcers, effective treatment of ulceration is the key to decrease the number of amputations, as Emphasized in the - St Vincent Declaration.[7,8] Venous leg ulcers[9] are estimated to affect approximately 3.5% of the general population while 15% of all diabetic patients[8] are affected by foot ulceration at some time. Women suffer more than men from lower limb ulcers, outnumbering them by a ratio of more than 2:1. Regardless of aetiology, foot ulcers cause considerable and prolonged distress[10] for patients. The present study was conducted to analyse the role of collagen dressing in healing of these ulcers in comparison with the conventional wound dressings.

Aim of the Study

To compare efficacy of conventional and collagen dressing in the healing of foot ulcers.

MATERIALS AND METHODS

The study was conducted for 100 patients over a period of 6 months in the Department of General Surgery, Kilpauk Medical College, Chennai. Patients were selected on the basis of non-probability (purposive) sampling method and grouped into two cohorts. One with collagen dressing will include 75 of them and the other cohort with conventional dressing will include 25. A collagen or conventional dressings will be applied, and the patients will be followed as per standard post-application treatment protocol. Patients will undergo dressing changes every 3 to 4 days until wound healing or for maximum period of 12 weeks.[4] Changes in wound size, healing and granulation rate, Requirement of skin cover will be recorded every week when the dressings are removed.

Age Range	Total	Females	Males
15-30 Yrs.	6	1	5
30-45 Yrs.	19	4	15
45-60 Yrs.	55	14	41
60-75 Yrs.	20	7	13
Total	100	26	74

Table 1. Distribution of Data According to Age and Gender

	Total	Group A- Collagen Dressing	Group B- Conventional Dressing
No. of Patients	100	75	25

Table 2. Distribution of Patients into Two Groups

Parameter	Collagen Dressing	Conventional Dressing
No. of Patients	33.5 cm^2	38 cm^2

Table 3. Average Initial Wound Size in Both Groups

RESULTS

Parameter	Treatment				p Value	Significance
	Collagen Dressing		Conventional Dressing			
Aetiology of Ulcer	N	%	N	%		
Diabetes	55	73.67	17	70.81		
Traumatic	10	13.18	5	20.83	0.81	Not Significant
Venous	10	3.6	3	8.33		
Total	75	75	25	25		

Table 4. Comparison of Aetiology in Both Groups

Parameter	Treatment				p Value	Significance
	Collagen Dressing		Conventional Dressing			
	Mean	SD	Mean	SD		
Q Size	6.49	3.40	8.63	2.89	0.001	Significant

Table 5. Comparison of Mean Reduction in Size of Ulcer in both Groups After 4 Weeks

Parameter	Treatment				p Value	Significance
	Collagen Dressing		Conventional Dressing			
	Mean	SD	Mean	SD		
Healing Time (Weeks)	4.62	1.18	7.78	1.61	0.001	Significant

Table 6. Comparison of Healing Time in Both Groups

Parameter	Treatment				p Value	Significance
	Collagen Dressing		Conventional Dressing			
Aetiology of Ulcer	N	%	N	%		
No	58	87.25	15	60	0.015	Significant
Yes	17	12.75	10	40		
Total	75	100	25	100		

Table 7. Requirement of Skin Cover After 8 Weeks

Critical Review of Statistics

1. We found high number of male (74%) had chronic leg ulcer as compared to female (26%). However, the gender distribution was comparable same in both collagen and conventional dressing groups (p>0.05).
2. The duration of ulcer healing is not consistent. In patients receiving conventional dressing (7.78 ± 1.61 weeks) it was significantly higher as compared to patients receiving collagen dressing (4.62 ±1.18 weeks) (p<0.05).
3. The reduction in size at the end of 4 weeks was also significant. The reduction in the size of the ulcer was more in patients receiving collagen dressings compared the other group. (p 0.05).
4. We found that the aetiology of the ulcer was not significant in determining the outcome of wound healing between the two groups with p value as 0.81 (>0.05).
5. The requirement of Secondary skin cover use was also significantly lower in collagen dressing patients after 8 weeks (12.75%) as compared to conventional dressing patients (40%); p value = 0.015(<0.05).

In the present study, we have found an overall benefit of collagen onϖ the rate of wound healing compared with moistened gauze conventional dressing.

DISCUSSION

Wound healing[1] is a complex process that involves the timely expression of numerous growth factors that 0promote cellular migration and proliferation,[1] production of new connective tissue matrix[11,12] and collagen deposition.[11,12] The results were on par with that of literature, In a study by Veves in 276 patients with diabetic foot ulcer,[7] after 12 weeks of treatment, 51 (37.0%) Promogran[13] a collagen/oxidized regenerated cellulose[14] dressing-treated patients had complete wound closure as compared to 39 (28.3%) patients of control group (moistened gauze), but this difference was not statistically significant (P=0.12). In this study, author found an overall benefit of collagen on the rate of wound healing compared with moistened gauze.

Donaghue[15] compared the efficacy of a collagen-alginate topical wound. Dressing with that of regular gauze moistened with normal saline in 75 patients diabetic foot ulcers. The mean percent reduction of the wound area was 80.6% in the collagen-alginate dressing group and 61.1% in the gauze-dressing group. Complete healing was achieved in 48% of the collagen-alginate dressing group and 36% of the gauze-dressing group.

CONCLUSION

1. **Analytical-** In 75 patients collagen dressing was applied, whereas conventional dressing in 25 patients. All the patients were prospectively available for evaluation. On enrolment 0, the median wound size was 33.5 cm^2 in collagen dressing group and 38 cm^2 in conventional dressing group. Healing time, increased reduction in size of the ulcer and reduced requirement for secondary skin cover was observed in collagen dressing group as compared to conventional dressing group (all having p<0.001). No adverse event was reported in both the groups.
2. **Study Outcome-** Collagen dressing increases the rate of wound healing as compared to moistened gauze. It also reduces the requirement of skin cover. Further, it also reduces the follow up period and antibiotic use significantly as compared to conventional dressing.

Sl. No.	Name	Age/Sex	IP No.	IWS (cm^2)	HT (Wks)	RWS	SC
1.	Suresh	62/M	356378	36.2	5.4	5.25	N
2.	Vijayalakshmi	45/F	356568	30.5	4.5	4.46	N
3.	Balaguru	55/M	355678	42.4	8.3	7.46	Y
4.	Shanthi	66/F	316624	34.6	5.4	6.57	N
5.	Jeevan	33/M	337454	29.1	4.6	5.42	N
6.	Kamaraj	54/M	335656	33.6	3.6	6.54	N
7.	Madurai	56/M	323857	34.4	5.0	4.46	N
8.	Kuppan	34/M	335753	31.6	3.6	5.56	N
9.	Bhargavi	49/F	347688	38.4	4.7	7.47	N
10.	Ragupathy	56/M	387234	29.6	5.4	5.74	N
11.	Balaraman	47/M	398235	40.3	3.5	4.47	Y
12.	Aadhilingam	56/M	373535	34.6	4.6	5.64	N
13.	Jayganesh	70/M	373563	35.7	5.7	6.56	N
14.	Malathi	60/F	357346	32.5	3.8	5.57	N
15.	Ezhilmaran	56/M	365432	37.3	4.8	4.76	N
16.	Narayanan	22/M	372346	38.6	4.6	6.56	N
17.	Swaminathan	56/M	323653	37.34	4.4	7.79	Y
18.	Paraman	33/M	373424	28.6	4.1	5.56	N

19.	Lakshmi	53/F	382375	31.45	5.5	6.78	N
20.	Leelavathi	48/F	364245	31.75	3.3	4.54	Y
21.	Jyothibasu	32/M	397644	25.3	4.7	5.76	N
22.	Vijay	71/M	328476	43.6	5.4	6.57	N
23.	Karpagam	45/F	372544	36.45	6.7	7.78	N
24.	Murugan	58/M	383765	33.6	5.3	5.57	Y
25.	Eashwar	37/M	387343	38.3	5.5	6.45	N
26.	Malarvizhi	50/F	383247	32.6	3.7	4.63	N
27.	Antony	63/M	387246	34.35	4.3	5.84	Y
28.	Sathish	55/M	356678	36.75	5.5	6.45	N
29.	Iqbal	48/M	862456	33.5	4.6	4.76	N
30.	Nasreen	24/F	323876	37.4	4.8	4.45	Y
31.	Gandhi	57/M	347624	34.64	4.7	6.78	N
32.	Pavithra	77/F	387345	32.3	6.5	7.59	N
33.	Chandrasekar	43/M	394245	34.64	7.7	5.82	N
34.	Ramaraj	53/M	356678	37.35	4.8	6.53	N
35.	Peter	56/M	332985	34.46	5.9	5.84	Y
36.	Balapriya	58/F	334874	32.6	6.8	4.55	N
37.	Soorya	40/M	343764	29.4	3.7	6.76	Y
38.	Indhran	59/M	437656	31.7	3.6	5.57	N
39.	Munusamy	64/M	302398	32.3	4.8	6.68	N
40.	Bhaskaran	66/M	362567	30.67	4.7	7.56	N
41.	Mary	56/F	334764	26.7	4.6	5.63	N
42.	Periyasamy	36/M	332785	37.54	6.8	6.55	N
43.	Valli	58/F	359328	34.6	5.2	7.67	Y
44.	George	55/M	334876	34.5	6.4	5.54	N
45.	Sekar	56/M	383725	37.6	4.5	6.68	N
46.	Xavier	46/M	338475	35.5	4.2	5.57	N
47.	Seetha	59/F	383746	33.7	5.3	4.86	N
48.	Veerappan	49/M	337566	35.5	4.4	6.43	Y
49.	Md.Aleem	27/M	332874	31.75	3.6	7.34	N
50.	Karthikeyan	51/M	383726	33.5	4.4	5.65	N
51.	Chinnathayi	33/F	383746	35.7	5.7	4.78	N
52.	Perumal	49/M	324875	36.64	4.3	5.56	N
53.	Ravindran	44/M	350968	34.7	4.6	5.67	N
54.	Moorthy	72/M	323446	41.5	6.3	6.45	Y
55.	Padmanabhan	48/M	390877	37.7	7.5	4.76	N
56.	Hariprasad	58/M	338745	35.4	4.3	6.42	N
57.	Malliga	73/F	364897	33.7	5.6	5.75	N
58.	Babu	49/M	328947	37.5	6.3	4.48	N
59.	Kannan	50/M	369808	34.7	4.2	5.86	Y
60.	Robert	25/M	326354	36.7	5.6	4.47	N
61.	Ramamoorthy	55/M	396856	34.75	4.3	6..58	N
62.	Saravanan	56/M	393876	46.4	5.5	5.47	N
63.	Dharmalingam	70/M	386097	34.72	5.4	7.82	N
64.	Saroja	56/F	303945	36.4	5.7	4.47	Y
65.	Thirumoorthy	41/M	394366	34.76	4.4	7.58	N
66.	Kalaiselvan	46/M	334577	36.4	5.4	7.46	Y
67.	Rajendran	45/M	339085	24.7	4.2	4.86	N
68.	Yusuf	36/M	303894	35.6	5.6	6.68	N
69.	Savithri	38/F	393577	33.53	4.4	5.46	Y
70.	Dhanasekar	59/M	332689	22.6	5.5	6.68	N
71.	Malini	48/F	305854	34.4	6.9	4.46	Y
72.	Nathan	19/M	330986	35.6	5.6	6.57	N

73.	Durairaj	54/M	373656	34.4	5.5	4.35	N
74.	Jayamala	31/F	334876	33.75	6.8	5.33	N
75.	Manigandan	53/M	339856	35.4	6.1	7.75	N

Chart A. Master Chart for Patients with Collagen Dressing

Sl. No.	Name	Age/Sex	IP no.	IWS	HT	RWS	SC
1.	Arjun	61/M	383274	31.5	7.3	6.35	N
2.	Krishnan	48/M	328576	25.54	8.4	7.64	Y
3.	Vanaja	72/F	349678	36.4	6.5	9.35	N
4.	Prabhu	58/M	339866	33.64	9.2	7.56	N
5.	Balaguru	38/M	334986	34.5	8.3	8.34	Y
6..	Santhanam	52/M	339567	37.6	5.7	7.74	Y
7.	Radha	49/F	334975	29.6	7.6	8.53	N
8.	Malik	36/M	356877	36.5	8.9	6.78	N
9.	Yuvaraj	69/M	339246	34.6	7.3	8.68	Y
10.	Esther	73/F	394686	32.6	8.5	7.68	N
11.	Mahadevan	46/M	323986	36.64	8.3	6.38	N
12.	David	56/M	335966	32.46	6.2	7.77	Y
13.	Savitha	37/F	303964	45.7	5.5	8.35	N
14.	Sivakumar	29/M	332984	36.4	7.3	7.57	N
15.	Parthiban	58/M	332948	43.6	5.6	8.76	Y
16.	Pandiyaraj	57/M	338756	36.6	8.4	7.44	N
17.	Anandraja	65/M	323648	44.7	6.5	6.67	Y
18.	Fathima	50/F	332464	36.6	9.2	7.41	N
19.	Prabakar	54/M	325665	47.64	7.7	8.68	Y
20.	Dilipan	51/M	353486	37.35	8.1	7.33	Y
21.	Narasiman	68/M	356346	38.4	6.5	8.57	N
22.	Ganesh	57/M	323496	44.45	8.3	8.34	N
23.	Sudha	64/F	314850	38.45	6.2	7.84	N
24.	Giridharan	57/M	346893	36.3	7.5	9.67	Y
25.	Gurumoorthy	41/M	302348	38.4	9.7	6.43	N

Chart B. Master Chart for Patients with Conventional Dressing

Column Data	Interpretation
M	Male
F	Female
IWS	Initial Wound Size
HT (In Weeks)	Healing Time
RWS	Reduced Wound Size (at 4 weeks of dressing)
SC	Requirement of Skin Graft (after 8 weeks of dressing)

Keyword for Master Chart

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