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A Comparative Study Between Collagen Sheet Dressing and Conventional Paraffin Gauze Dressing to Donor Site in Patients Undergoing Split Skin Grafting

Balaji Rajavarman[1*], Manigandan Raju[2], Sangeethapriya AS[3], Umesh Raj Somasundaram[4]

[1]Panimalar Medical College Hospital and Research Institute, Chennai, India
[2,3,4]Melmaruvathur Adhiparasakthi Institute of Medical Sciences, Melmaruvathur, Tamil Nadu, India

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***Corresponding author**:
Dr. Balaji Rajavarman H
(Email: rajavarman12@gmail.com)

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ABSTRACT

Introduction: Split skin grafting is a common procedure that causes partial thickness injury, typically treated with paraffin-soaked gauze. Re-epithelialization occurs in two weeks, but complications like pain, infection, and delayed healing can arise. This study aimed to compare collagen sheet dressing with conventional gauze dressing in reducing pain, promoting healing, and preventing infection in donor sites.

Material and Methods: A prospective comparative study was conducted at a tertiary care hospital from December 2021 to January 2024. Fifty patients undergoing split skin graft surgery were assigned to either Group A (collagen sheet) or Group B (paraffin gauze). Outcomes such as pain, re-epithelialization, and infection were compared using descriptive statistics, chi-square, Fischer's exact, and Student's t-tests. P<0.05 was considered significant.

Results: The mean age of Group A and Group B was 53.92 and 56.6 years, respectively. Pain scores were significantly lower in the collagen group (P<0.05). Epithelialization on day 10 was higher in the collagen group (85.2±5.09) compared to the conventional group (68.4±8). One patient in the conventional group had an infection, whereas none were observed in the collagen group.

Conclusion: Collagen sheet dressing in split skin grafting donor sites results in reduced pain, faster epithelialization, and lower infection rates.

Keywords: Collagen dressing, Split Skin grafting, Epithelization

INTRODUCTION

One of the commonly done procedures in general surgery and plastic surgery is split skin grafting. It is done in place where primary closure could not be done like post debridement raw area, donor areas of fascio and myo cutaneous flaps, post burns contracture release etc.[1] The donor skin is harvested from various parts of the body like thighs, legs, hands, back etc and placed over the recipient area.[2–4]

After split skin graft harvesting, donor site wounds are rather standard clean wounds and are usually covered with paraffin-soaked gauze and gamgee pads. Based on the thickness of the split skin graft, re-epithelialization of donor site wound completes in 7 to 21 days.[3,5]

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Following split skin graft, morbidities like post-operative wound soakage, pain in the donor area, chances of infection and delayed epithelialization could occur.[5–7] To reduce the morbidity caused in the donor area several dressing materials have been used like paraffin gauze, banana leaves, polyethylene surgical drapes, collagen sheets have been tried. Conventional gauze dressings like paraffin, petroleum soaked gauze dressings, often lead to increased discomfort and longer re-epithelialization times due to their adherence to the wound surface.[8]

The ideal dressing for split-thickness skin graft donor site wound would promote healing, cause minimal pain over donor site, prevent infection and be inexpensive and easy to use.[1,9,10] Collagen sheets are generally used to cover the exposed dermis caused by superficial burns.[11] These collagen sheets which are natural, non-immunogenic, non-pyrogenic, hypo-allergenic and pain-free are readily available, cost effective and promote faster wound healing. [12] In India only very few studies are available comparing collagen dressing with other types.[1,3,8,11]

This study compares the efficacy of collagen sheet dressing over conventional dressing to the donor site wound following split skin grafting in reducing the morbidity such as pain, re-epithelialization and infection rate.

MATERIALS AND METHODS

This is a comparative non-randomized controlled trial conducted in department of general surgery at Melmaruvathur Adhiparasakthi Institute of Medical Sciences and research, Melmaruvathur for a period of two years from January 2022 to December 2023. The study has obtained necessary Institutional Ethical committee approval (Serial number: MAPIMS/IEC/52/2021) and has been registered with Clinical Trial Registry, India (CTRI/2022/02/051279). A written informed consent was obtained from all the study participants.

Sample size calculation: The sample size was calculated using open epi software for mean difference. The mean duration of hospital stay in study group (4.4±1.22) and control group (5.47±1.43) was considered and sample size of 50 was achieved at 95% confidence interval and power 80%.[1] 25 patients in each group in 1:1 ratio.

Selection criteria: 50 patients aged more than 18 years who were planned to undergo split thickness skin grafting procedure were included in this study. Children under 18 years, patients with absolute and relative contraindications to undergo split skin grafting, immunocompromised and mentally ill patients were excluded from the study. consecutive sampling method was adopted.

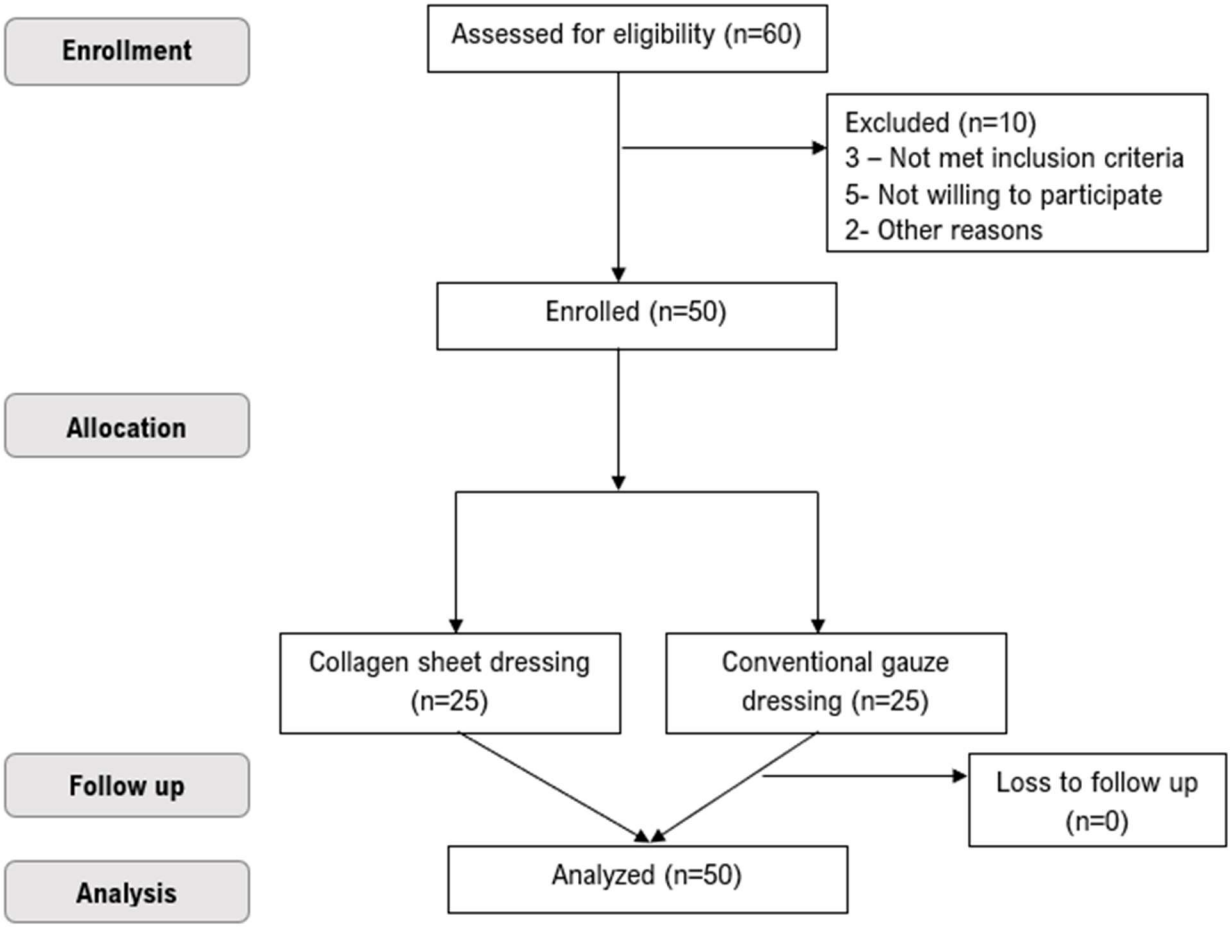

Figure 1: Flowchart of study design

25 eligible study participants were allotted to group A who underwent collagen sheet dressing and 25 eligible participants to group B who underwent paraffin gauze dressing. The patients were assigned to group A and group B based on their willingness. The procedure was performed after obtaining the written informed consent. There was no attrition. (Figure 1)

Outcome assessed: Patients were assessed for pain using Visual Analogue Scale on a score of 0-10 where 0 is no pain and 10 is the most severe pain, before the morning dose of analgesic, on day 0, 3, 5, 7 and 10. Wound healing and infection were assessed by the percentage of epithelisation on post-operative day 7 and 10 by trained residents in department of General Surgery. Patients in group B received standard analgesics for 5 days and patients in group A received analgesics on request. When the patient developed dressing soakage, over padding was done in patients with paraffin gauze dressing. None of the patients with collagen dressing developed soakage.

Statistical analysis: Data were entered in Microsoft excel and analysed using SPSS 22 version software. Descriptive statistics presented as Mean ± SD, frequencies and percentages. Chi-square test and Fischer's Exact test used as test of significance for qualitative data. Student's t test and Mann-Whitney U test were used as a test of significance for quantitative data. P value <0.05 was considered as statistically significant at 95% confidence interval.

RESULTS

The mean age was 53.92 years in the collagen group and 56.6 years in the conventional dressing group (Table 1). Most of the participants were in the age group of over 60 years (Figure 2). Males were higher than females in both the groups (Table 2). There was no statistically significant difference in age (student's t test; P= 0.411) and sex distribution (Chi-square test; P=0.771).

In Group A who had collagen dressing, the VAS score was lower on all days on assessment (day 0,3,5,7 and 10). The scores were significantly lower in collagen group compared to conventional dressing group (Student's t test and Mann-Whitney U test; P<0.01) (Table 3). Average epithelialization was higher among collagen group (85.2±5.09) on day 10 as compared to conventional group (68.4±8) and this was found to be statistically significant (Student's t test; P<0.001) (Table 4). Infection over donor site was seen in one patient in conventional group and none in collagen group and the difference was not statistically significant (Fischer's Exact test; P=1) (Table 5).

Table 1: Comparison of age distribution

Group	Collagen sheet dressing	Conventional gauze dressing
n	25	25
Minimum	23	39
Maximum	73	72
Mean ± SD	53.92 ± 12.73	56.6 ± 9.95

P value -0.411*- Unpaired t test – P<0.05 considered statistically significant

Table 2: Comparison of gender among Group A and B

Gender	Total	Group A (%)	Group B (%)	P value
n	50	25	25	0.771
Male	31 (62)	15 (60)	16 (64)	
Female	19 (38)	10 (40)	9 (36)	

P value -0.77*- *- Chi-square test – P<0.05 considered statistically significant

Table 3: Comparison of mean visual analogue scores on day 0, 3, 5, 7 and 10

Day	Collagen dressing		Conventional dressing		P value
	Mean	SD	Mean	SD	
0†	7.36	0.7	8.28	0.79	<0.001*
3†	4.2	0.65	7	0.65	<0.001*
	Mean Rank	Sum of ranks	Mean Rank	Sum of ranks	
5‡	13	325	38	950	<0.001*
7‡	13	325	38	950	<0.001*
10‡	18.5	462.5	32.5	812.5	<0.001*

*- P<0.05 considered statistically significant; † - Unpaired t test; ‡ - Mann-Whitney U test

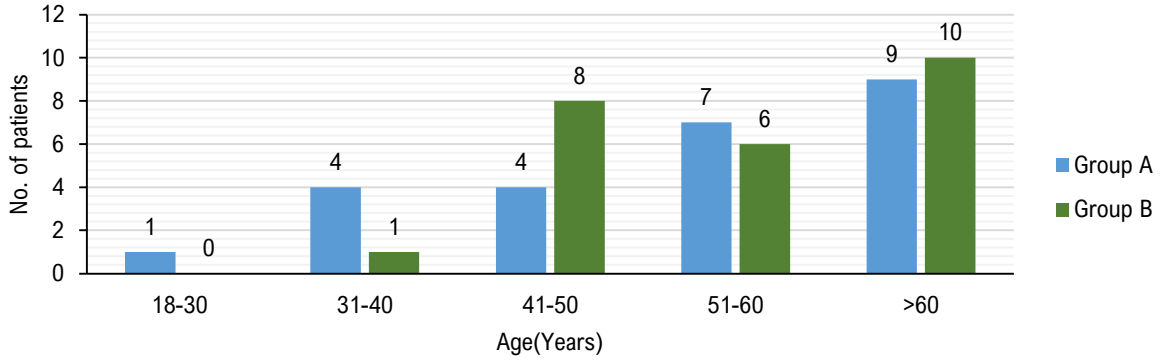

Figure 2: Age wise distribution of study participants

Table 4: Comparison of average epithelialization on day 7 and day 10

Day	Total	Collagen dressing		Conventional dressing		P value
		Mean	SD	Mean	SD	
7	28.4	32.8	7.37	24	5	<0.001*
10	76.8	85.2	5.09	68.4	8	<0.001*

*- Unpaired t test – P<0.05 considered statistically significant

Table 5: Comparison of infection over the donor site on day 10

Infection	Group A N (%)	Group B N (%)	P value
Yes	0	1	1
No	25	24	

- Fischer's exact test – P<0.05 considered statistically significant

DISCUSSION

Pain over the donor site wound was the usual complaint following split skin graft surgery. In this study, the mean visual analogue scores were highly significantly lower throughout the assessment in collagen sheet dressing group compared to conventional paraffin-soaked gauze dressing group. Average epithelialization was higher in collagen group which was also significant.

Many studies have been done comparing the efficacies of different types of dressings. In a prospective controlled study done by Gore et al, the investigators compared polyethylene surgical drape and banana leaf in 50 patients and they found that polyethylene surgical drape had only a slight advantage in controlling the post-operative pain whereas they found both were equally effective.[13]

Arjun et al conducted a prospective controlled study involving 52 patients who were divided into 2 groups which compared platelet rich plasma with collagen dressing and the result showed collagen dressing had a slight edge over platelet rich plasma in controlling the pain but in the group with patients who received platelet rich plasma dressing had faster wound healing.[14]

In a retrospective study Chowdry et al compared cellulose/collagen/silver oxidised cellulose with paraffin gauze dressing in 50 patients divided in 2 groups and the post-operative pain was less in collagen dressing group and it was statistically significant.[15] Study conducted by Das et al[1] showed that the mean visual analogue scores were lower on all 6 days (1,2,3,7,14 and 21) which was significant. All the patients who had collagen sheet dressing had complete healing on day 21 assessment whereas 10% of the patients in conventional dressing had incomplete healing. Infection occurred in 2 out of 30 patients in collagen dressing and 3 patients in conventional dressing. This was in accordance to our study. Another study by Ramesh et al[11] where numerical pain rating scale was used to assess pain also showed similar findings with lower scores in collagen dressing. This reduced pain at the donor site is due to the reasons that collagen dressings can provide anti-infective, anti-inflammatory, antifibrotic, and analgesic properties, and promote angiogenesis.[16]

Sreekumar et al study where 20 patients were included and males were higher compared to females similar to the present study also showed that mean visual analogue score was less in collagen group. [3] However, two patients in both the groups developed soakage and infection. Average epithelialization on 10th day was higher (98%) in collagen group than conventional group (95%) which was like the present study.

LIMITATIONS

Determinant variables of wound healing were not studied and follow-up till complete wound healing could not be done and hence time taken for complete healing was not included in this study.

CONCLUSION

Collagen dressings at the donor site wound after split skin graft surgery has minimal pain and infection rates. Another advantage is that there was no soaking of the donor site which reduced the need for frequent change of dressing. collagen had minimal advantage of higher percentage of epithelialization.

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