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Role of Chlorhexidine Tulle and Collagen Sheet for Split Skin Graft Donor Site Dressing

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Abstract

Background: Split-thickness skin grafting is the most frequently used procedure in plastic surgery for the replacement of damaged or missing skin. The treatment protocol involves a variety of techniques and dressing materials, and all of them aim for a fast, spontaneous re-epithelialization of the donor sites. Treatment of the split-thickness autograft donor sites has been studied over the years but there is no standard treatment for managing these sites. Recently, chlorhexidine tulle and collagen sheet were found to be effective in the management of donor sites hence, we have undertaken the current study.

Methods: This study was prospective in nature on 35 donors operated for Skin grafting in our tertiary care institute.

Results: Majority of the cases were from 31-50 years. There were no significant differences in demographic parameters between the two groups at baseline. Collagen dressing had significantly lesser healing time than Chlorhexidine tulle. Incidence of infection was more in CHT group (16.7%). However, the difference was not statistically significant. (p=0.08). Pain score was gradually decreasing in both the groups on subsequent follow up but it was significantly lower in Collagen dressing group at each follow up visit (p< 0.05).

Conclusion: Collagen dressing has advantages over chlorhexidine tulle dressing in terms of early re-epithelization and less discomfort during applications.

Keywords: Split-thickness skin grafting, chlorhexidine tulle, Collagen dressing, pain score, donor site dressing.

Introduction

Split-thickness skin grafting is the most frequently used procedure in plastic surgery for the replacement of damaged or missing skin. The success of the procedure depends on the complete integration of the graft with the

recipient bed and on the re-epithelialization of the skin graft donor site.[1] The treatment protocol involves a variety of techniques and dressing materials, and all of them aim for a fast, spontaneous re-epithelialization of the donor sites.[2]

In general, the methods of treating donor wounds are categorized as open, semi-open, and closed.[3] The open method refers to the method where the wound remains exposed and it is allowed to heal without a dressing. The semi-open method means the wound bed is covered with dressing just once and then the wound is allowed to heal by the open method while in the closed method; the wound dressing is left intact for two to seven days. The most common approach is to make multiple dressing changes until the wound is completely healed. Among these techniques, the closed methods have become the most attractive technique over the last decade.[4]

Paraffin gauze dressing is recognized as a standard treatment for split-thickness skin graft donor sites.[5] It is considered to be non-adherent; nevertheless, it usually sticks to the wound surface while it absorbs exudate. Early removal of the dressing may lead to skin maceration or wound infection and wound epithelialization may slough off, accompanied by local pain aggravation and wound deepening.[6] In contrast, chlorhexidine is an antibacterial agent which is effective against a wide range of Gram-positive and Gram-negative bacteria, including Methicillin-resistant Staphylococcus aureus (MRSA). Traditionally, mesh paraffin gauze with chlorhexidine is normally used for the treatment of donor-site wounds. Chlorhexidine can bind to bacterial cell walls at low concentrations, causing an alteration of the bacterial cell osmotic equilibrium and leakage. One of the disadvantages of this traditional gauze includes adherence to wounds, which can cause trauma to epithelial cells when removed.

Collagen is an endogenous substance, which forms an important structural component in connective tissue and is of special importance in the skin.[7] Biological dressing with collagen, create the most physiological interface between the wound surface and environment and are impermeable to bacteria. Collagen dressings have other advantage over conventional dressings in terms of easy application and being natural, non-immunogenic, non-pyrogenic, hypo-allergic and pain free.[8]

Treatment of the split-thickness autograft donor sites has been studied over the years but there is no standard treatment for managing these sites, hence we have undertaken the current study.

Objectives

- To assess the role of chlorhexidine tulle and collagen sheet for split skin graft donor site dressing with respect to ease of application, pain score, infection and healing time.

Materials and Methods

The present study was prospective in nature, protocol of which was approved by the Institutional Ethical committee of the medical college. Written informed consent was taken from all study subjects.

All patients fulfilling inclusion criteria and exclusion criteria in our tertiary care institute were taken up for the study until fulfilling the required sample size. Study was carried out over a period of two years from 2012 to 2014.

Inclusion criteria was male and female donors, 10-65 years of age, operated for Skin grafting in our tertiary care institute. They were then randomly allocated to two study groups according to type of dressing used:

Group A: SSG donor site dressing with Chlorhexidine Tulle;

Group B: SSG donor site dressing with Collagen.

A complete pre-operative assessment was done for all the patients. All relevant investigations were carried out and patient's fitness was checked out. After assessment, patients were explained the procedure and written informed consent was taken. Once the patient was operated, he was randomly divided into one of the two groups according to type of dressing used, as mentioned above. Pain Score was calculated on Day 1, 2, 7 and 14 by using Visual Analog Scale. 1 to 3 is considered as mild pain, 4 to 7 as moderate pain and 8 to 10 as severe pain. First checkup of wound dressing was done on Day – 14th after surgery and portions of wound were checked and compared based on: ease of application, infection and healing time. Second check-dress was done after 3 days from first check-dress.

Figure 1: Wound with Chlorhexidine Tulle (BACTIGRAS) Dressing on 14th Day

Figure 2: Wound with Collagen Dressing on 14th Day

Convenience type of Sampling was used for the selection of study subjects. A total of 35 donors operated for Skin grafting were selected for study after taking prior informed consent. All the collected data was entered in Microsoft Excel sheet and analysed using SPSS version 20. The Quantitative data was presented as mean and standard deviation while Qualitative data was presented as frequency and percentage and compared among the groups by using chi-square test Ordinal data (eg. Pain score) was presented as median and range and compared using Mann Whitney test. P-value of < 0.05 was considered as significant.

Results

In the present prospective study, there was no denial to participate in the study, so the response rate was 100%. Maximum, cases in both the groups were from the age group of 31-50 years. Mean Age of study subjects was 35.68 years. Out of total subjects, 55.6% and 47.15% were males in CHT and Collagen dressing group respectively. Diabetes was present in 11.1% and 29.4% of subjects in CHT and Collagen dressing group respectively. Immuno-compromised status was present in 5.65 and 11.8% subjects in CHT and Collagen dressing group respectively. There was no significant difference was observed in between both groups on the basis of age, gender, history of DM and immuno-compromised status ($p>0.05$). (Table 1)

Table 1: Distribution of patients according to baseline characteristics

Baseline characteristic		Chlorhexidine Tulle group (n=18)	Collagen group (n=17)	P value
Age	<30	06 (33.30)	06 (35.30)	0.8
	31-50	10 (55.60)	08 (47.10)	
	>50	02 (11.10)	03 (17.60)	
Gender	Female	08 (44.40)	09 (52.90)	0.8
	Male	10 (55.60)	08 (47.10)	
History of DM	Yes	16 (88.90)	12 (70.60)	0.3
	No	02 (11.10)	05 (29.40)	
Immunocompromised status	Yes	17 (94.40)	15 (88.20)	0.9
	No	01 (5.60)	02 (11.80)	

Collagen dressing had significantly lesser healing time than CHT (15.3 days Vs. 19.7 days) ($p< 0.01$). Incidence of infection was present in 3 patients out of 18 (16.7%) in CHT group while none among in collagen group. However, the difference was not statistically significant. ($p=0.08$). CHT had greater ease of application compared to Collagen dressing ($p<0.01$). Pain score was gradually decreasing in both the groups on subsequent follow up but it was significantly lower in Collagen group at each follow up visit ($p< 0.01$). (Table 2) (Figure 3 & 4)

Table 2: Comparison of outcome of chlorhexidine tulle and collagen sheet for split skin graft donor site dressing

Outcome		Chlorhexidine Tulle group (n=18)	Collagen group (n=17)	P value
Healing time (days)	Mean $\pm$ SD	19.7 $\pm$ 1.5	15.3 $\pm$ 1.1	<0.01
Incidence of infection	No (%)	03 (16.7)	00 (00)	0.08
Ease of application	No (%)	18 (100)	00 (00)	<0.01
Median pain scores	Day 1	4.5	2	<0.01
	Day 2	3	1	
	Day 7	1.5	0	
	Day 14	1	0	

Figure 3: Chlorhexidine Tulle (BACTIGRAS) Dressing

Figure 4: Collagen Dressing

Discussion

This present study was prospectively analyzed comparative utility of chlorhexidine tulle and collagen sheet for split skin graft donor site dressing with respect to ease of application, pain score, infection and healing time.

In the present study, there were no significant differences in demographic parameters between the two groups at baseline including age, gender and presence of comorbidity including DM.

In the present study, collagen dressing had significantly lesser healing time than Chlorhexidine tulle (CHT) (15.3 days Vs. 19.7 days) ($p< 0.01$). Incidence of infection was more in CHT group (16.7%) while none among collagen group. However, the difference was not statistically significant. ($p=0.08$). Ease of application was significantly better with Chlorhexidine tulle dressing as compared to collagen dressing. Pain score was gradually decreasing in both the groups on subsequent follow up but it was significantly lower in Collagen dressing group at each follow up visit ($p< 0.05$).

These findings observed were consistent with the findings observed in various studies comparing chlorhexidine dressing with other dressings; and collagen dressing with other conventional dressings.

In a study done by Pornprom Muangman et al.[9] comparing Bactigras (chlorhexidine dressing) versus Telfa AMD (Polyhexamethylene Biguanide) for skin graft donor site dressing. There was no significant difference in age, area of donor sites or length of hospital stays between the groups ($p > 0.05$). However, the day of re-epithelialization (> 90%) was significantly shorter in patients treated with the Telfa AMD compared to the Bactigras group ($p < 0.001$). The average pain score was also significantly lower in the Telfa AMD group. There was no difference in the cost of treatment between the groups. With respect to bacterial growth, one patient in the Bactigras group was found to have a local infection on the tenth day with P. aeruginosa.

In the non comparitive study done by Halankar P et al[10] including 30 patients, using collagen dressing in all patients. It was observed that 24 patients showed 100% reepithelialisation, 4 showed between 90-100%, while the two with infected donor sites had < 90% reepithelialisation. In terms of pain score, 21 patients (70%) assessed the pain as minimal, 7 (23%) assessed the pain as moderate and 2 (7%) as severe.

In a study done by Fatih Uygur[11] on 26 patients compared donor site treatment with the standard mesh paraffin gauze dressing and mesh paraffin gauze dressing combined with bovin type I collagen spray. After graft harvest, a standard gauze dressing was used in control group (n = 13). In the gelfix (collagen spray) group (n = 13), the spray was used just before gauze dressing. The epithelisation time for the gelfix group was earlier than control group ($p < 0.05$)). In the gelfix group, there was pain relief up to 40 h from the operation.

Singh Onkar et al.[12] observed that there is statistically significant difference in the average time for appearance of healthy granulation tissue over the wounds that were treated with collagen dressing (8 days) as compared to conventional dressings (14 days) (p value 0.03).

Conclusion

Collagen dressing has advantages over chlorhexidine tulle dressing in terms of early re-epithelization and less discomfort during applications.

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