

Original Research Article

In search of ideal donor site wound dressings

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ABSTRACT

Background: Split skin grafting (SSG) is a commonly used reconstructive technique for wound cover. Donor site wounds (DSW) after split-skin graft harvesting are rather clean wounds. Depending on the thickness of the SSG, the DSW should re-epithelialize completely in 7 to 21 days. This study was initiated with a background to look for an ideal dressing for the management of DSW. Aim of the study was to compare efficacy of Cellulose acetate mesh, Collagen sheet, Hydrocolloid dressings and chlorhexidine tulle for donor site wound management after harvesting split thickness skin graft.

Methods: 100 patients with 100 donor site wounds were included in the study. Patients were randomized into four different groups of 25 each, depending upon the type of dressings used to cover the wound. Data regarding time to complete wound healing and pain at the donor site were recorded on visual analogue scale (VAS). Requirement of pain killers during post-operative period were recorded. Complications like infection or hyper-granulation were also recorded.

Results: The study included 72 males and 28 females. The primary objective was to observe the effectiveness of wound dressings in the treatment of DSWs and time to complete wound healing. In this context, collagen dressing was found to be the most effective in current study ($p < 0.07$) and also the least pain was experienced by the patients where collagen dressings were used.

Conclusions: The study concluded that collagen dressings was best amongst the various dressings studied with average healing time of 9 days with least pain score over DSW.

Keywords: Donor site dressings, Cellulose acetate mesh, Collagen sheet, Hydrocolloid dressings, Chlorhexidine tulle

INTRODUCTION

Split skin grafting (SSG) is a widely used reconstructive technique to repair skin defects which are unlikely to heal with secondary intention or does not warrant coverage with a skin flap¹⁻³. Donor site wounds (DSW) after split-skin graft harvesting are rather 'standard' clean wounds. Depending on the thickness of the SSG, the DSW should re-epithelialize completely in 7 to 21 days. At present, lots of dressings and topical agents for donor site wounds are commercially available. The ideal SSG donor-site dressing would promote healing, cause slight pain, prevent infection, negligible scarring; inexpensive and

easy to use. A dressing which possesses all of these attributes has yet to be established and currently few dressing methods meet some of these criteria to varying degrees⁴. This causes large variation in the local care of these wounds, while the optimum 'standard' dressing for local wound care is unclear. Hence the current study was conducted to compare four dressing materials, which were Cellulose acetate mesh, Collagen sheet, Hydrocolloid dressings and Chlorhexidine tulle, for the management of split skin graft DSW to establish standard guidelines for donor site wound management in our population. Aims and objectives of the study were to compare efficacy of Cellulose acetate mesh, collagen

sheet, hydrocolloid dressings and chlorhexidine tulle for donor site wound management after harvesting split thickness skin graft.

METHODS

The study was designed as a prospective descriptive analytical study and included patients (n=100) with ulcer or wounds requiring SSG in study at a tertiary care centre of India from December 2017 to December 2018.

Inclusion criteria: All patients either hospitalized or under treatment in the outpatient clinic, who needed SSG coverage for a wound for any reason included in this study. The DSW should have a minimum size of 15 cm² and be suitable for all treatment options in the trial.

Exclusion criteria: Patients with systemic illnesses i.e. chronic renal dysfunction, diabetes mellitus or taking chemotherapy or corticosteroids were excluded from the study, as these factors may lead to delayed wound healing.

Informed consent was obtained from each patient. A detailed clinical history was recorded. The demographic and epidemiologic data were recorded for each patient. The patients were given pre-operative prophylactic antibiotics as per Hospital Antibiotic Guidelines. Data on all important adverse events or side effects in each intervention group were recorded as well.

Surgical procedure

SSG was harvested with an electric dermatome or free hand-knife, as per standard protocol. The SSG taken were between 0.20 and 0.30 mm to achieve a reasonably uniform depth of the DSW and were taken from thighs, legs or back. The adrenaline-soaked gauze was used for hemostasis of the DSW before definitive dressings were applied.

Wound treatment

Local wound care according to the assigned dressing group started as per randomization. The brand of the dressing was recorded. No combinations of products from other dressing groups were done, to ensure that the effect found after completion of the trial could be attributed only to the dressing to which the patient was allocated. The optimum changing frequency was pursued as advised for each dressing material. This differed from no dressing changes (e.g. collagen) to daily changes in case of leakage (e.g. hydrocolloid). The primary dressings were covered with cotton gauzes and bandages.

Outcome variables

The primary endpoint with respect to the effectiveness of wound dressings in the treatment of DSWs was time to complete wound healing. The endpoint was assessed by an independent clinician who was not aware of the

treatment given. The second primary outcome was pain from the donor site area. It was documented by the patient on a visual analogue scale (VAS), varying from 0 (no pain) to 10 (intolerable pain). This was scored daily for the first week postoperatively and twice a week thereafter till DSW completely healed, in a patient-held diary.⁵ The secondary endpoints were to assess the occurrence of local complications, e.g. wound infections, based on clinical symptoms of infection, scarring at 12 weeks postoperatively (using patient and observer scar assessment scale (POSAS) assessed by the patients themselves and treating surgeons, patient satisfaction (varying from 0 (absolutely satisfied) to 10 (absolutely dissatisfied))⁶. Itching scores are also collected by using a VAS, ranging from 0 (no itching) to 10 (intolerable itching) and obtained through the patient-held diary.

Case definition

The wound healing was defined as re-epithelialization of the total wound surface, thereby meaning until all crusts have come off.

SPSS (Statistical Package for Social Sciences for Windows) software was used to analyse all the results. Demographic data was analysed using ANOVA test. Kruskal-Wallis & Mann-Whitney U tests were used to analyze differences between variables. Statistical analysis of the healing time and pain severity score was done by Kruskal-Wallis test to differentiate between methods. When analyzing variables descriptive statistics (mean and standard deviation) were used. Results were evaluated in 95% confidence intervals and significance was ascribed to a p-value <0.05.

RESULTS

There was no statistically significant difference in demographic data in the groups (Table 1). There was a difference between four methods in average time of repair and dressing with collagen (9.2 days) had the least time of repair (p<0.07) (Table 1 and Figure 2). Pain severity was the least in collagen sheet and difference between the groups was significant (p<0.006) (Table 2 and Figure-2).

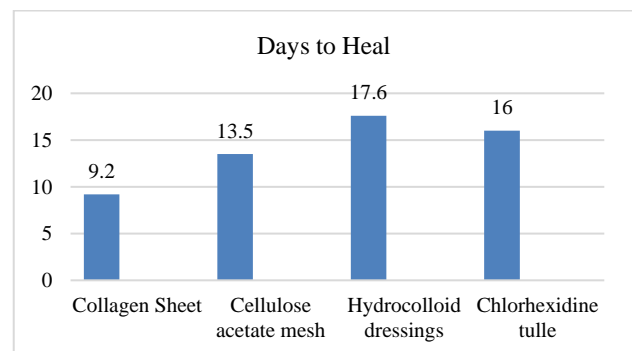


Figure 1: Duration of healing by different dressings in the enrolled patients.

Table 1: Demographic profile and characteristics of patients in treatment with collagen sheet, cellulose acetate mesh, hydrocolloid dressings and chlorhexidine.

Characteristics	Collagen sheet N (%), Mean (SD)	Cellulose acetate mesh N (%), Mean (SD)	Hydrocolloid dressings N (%), Mean (SD)	Chlorhexidine tulle N (%), Mean (SD)	P value*
Gender					
Male	16(64)	18(72)	20(80)	18(72)	0.08*
Female	9(36)	7(28)	5(20)	7(28)	
Age (years)	34.44(15.21)	35.28(11.46)	36.72(14.98)	35.52(9.66)	0.06**
Area of donor sites (cm²)	341(176.90)	400(178.24)	333.2(139.84)	452(162.32)	0.859**
Analgesics	1.76(1.16)	2.64(1.07)	4.08(0.64)	3.48(1.15)	0.002**
Days to heal	9.20(1.50)	13.5(2.88)	17.6(2.46)	16.0(2.57)	0.07**
Scar assessment by the patient	2.3(0.9)	3.3(0.9)	3.7(0.7)	4(0.8)	0.1**
Scar assessment by the surgeon	1.9(0.8)	2.3(0.9)	2.5(0.9)	2.3(0.8)	0.5**

* Chi square, ** one way ANOVA

Table 2: Assessment of the pain in treatment at intervals with Cellulose Acetate Mesh, collagen sheet, hydrocolloid dressings and chlorhexidine.

VAS	Collagen sheet			Cellulose acetate mesh			Hydrocolloid dressings			Chlorhexidine			P,F *
	POD1 Mean (S.D.)	POD3 Mean (S.D.)	POD5 Mean (S.D.)	POD1 Mean (S.D.)	POD3 Mean (S.D.)	POD5 Mean (S.D.)	POD1 Mean (S.D.)	POD3 Mean (S.D.)	POD5 Mean (S.D.)	POD1 Mean (S.D.)	POD3 Mean (S.D.)	POD5 Mean (S.D.)	
	3.84 (1.62)	1.92 (1.35)	0.48 (0.87)	5.28 (1.13)	3.52 (1.19)	2.80 (1.29)	6.88 (1.30)	5.12 (1.30)	4.16 (0.55)	6.80 (1.15)	4.80 (1.15)	3.20 (1.15)	P=0.006 F=2.32

* Repeated measures of ANOVA.

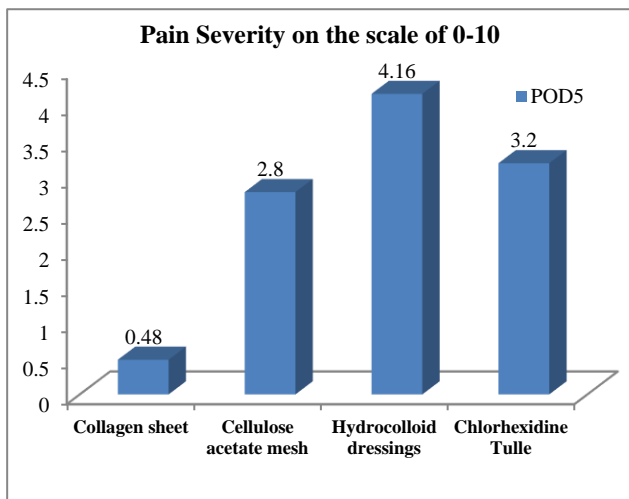


Figure 2: Comparison of pain severity scores as recorded by patients on a visual analogue scale at POD 5.

DISCUSSION

Skin covers the entire external surface of the human body and represents the largest single organ of human body. This integument acts as a one of the important protective

barriers viz. trauma, radiation, harsh environmental conditions and infection along with functions of thermoregulation and control of insensible fluid loss. Restoration of an intact skin barrier is of utmost importance following wounding to prevent infection, minimize wound contraction to maintain function, and minimize cosmetic disfigurement and to avoid volume depletion. Though, skin grafting was first performed around 2000 years ago but widespread work on the concept took pace in 20th century. Presently, grafting accounts to most rapid, effective method of reconstructing large skin defects.⁷



Figure 3: Hydrocolloid dressings on 20th post op day.

In a study by Ayaz et al conducted to evaluate effectiveness of collagen dressing in comparison to vaseline gauze dressing in healing of SSG donor site wound and to assess the rate of epithelialization, pain, pruritus, type and duration of need of analgesics.⁸ The comparison found that rate of epithelialization was faster with collagen as compared to vaseline gauze for donor site wound. There was also significant reduction in pain and pruritus in patients with collagen dressing along with considerable reduction in the need and duration of analgesics with collagen dressing. Usually, synthesis of collagen is mainly by fibroblasts which helps in cementing and acts as a plastic material in the process of wound healing. Amongst the other types of wound dressings or materials; Biological dressings such as collagen provide the most physiological interface between the environment and wound surface and is impermeable to bacteria. Also, for application of collagen dressing and its post application management no specific skill is required⁹. In a similar study, the study group proved that collagen dressing had lesser pain in comparison to control group.^{10,11}



Figure 4: Collagen dressing on 10th post op day.

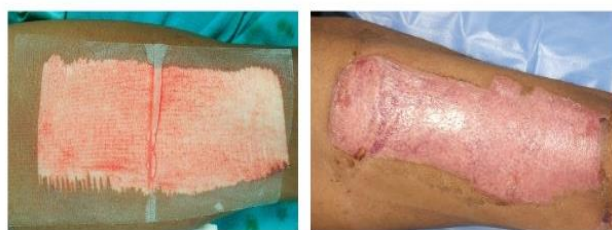


Figure 5: Cellulose acetate mesh on 14th post op day.

Harvest of split-thickness skin graft causes damage in epidermal and dermal layers of skin at the donor site. The management of the donor site after harvesting a split-thickness skin graft is an important issue, as patients often report more discomfort at the donor site than at the recipient site. Dressings are a mainstay for wound management. Our study reported the average time for appearance of healthy granulation tissue over the wounds that were treated with collagen dressing was nine days. Collagen, a major structural protein has been recommended by researchers for their active role in natural healing process and our study also showed that collagen dressings are better as compared to others.

CONCLUSION

This study compared efficacy of cellulose acetate mesh, collagen sheet, hydrocolloid dressings and chlorhexidine tulle for donor site wound management after harvesting split thickness skin graft. Collagen dressings were best amongst the various dressings studied with the fastest healing time and least pain score over DSW.

Limitations

Adverse events were monitored by the researchers who were not blinded, which could have introduced bias into the study. Future research with larger sample sizes examining pain and re-injury as separate endpoints is needed.

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