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Comparing Collagen Dressing with the Vaseline Gauze Dressing Over Split Skin Graft Donor Site

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Abstract

Background: The issues in the management of the donor site after harvesting a spilt thickness skin graft are taking care of discomfort and pain prevent sepsis, and promote primary healing with minimal scarring. The purpose of this study was to compare wound healing with a collagen dressing, against that produced by a Vaseline gauze dressing. *Material & Methods:* The Study was carried over a period of two years in the Department of Plastic Surgery, at tertiary care hospital at New Delhi from September 2010 to August 2012. The study population consisted of subjects requiring a split skin graft for a burn, for a raw area after trauma or local sepsis. A total of 40 patients were selected for the study. Amongst this Vaseline Gauze was used to dress the donor site of STSG in 20 patients. In the other 20 patients, Collagen dressing was used. All grafts were taken from anterior and lateral aspect of thigh. Both groups were compared for following parameters pain, soakage and epithialization. *Result:* The data was analyzed by matched pair analysis to calculate statistical significance of the observations. For each observation Chi-Square and p value was calculated. Following are the results for each observation: *Pain:* Chi-Square was 33.02 and P value was 0.001, Soakage on 7th day: Chi-Square result was 29.03 and P value was 0.048, Epithlialization on 14th Day: Chi-Square result was 27.03 and P value.>0.676. *Conclusion:* At the end of 24 hours 70% of collagen group were graded as low pain, while in the Vaseline group only 15% fell into group. This was a significant difference (p=0.001). The soakage under collagen dressing was significantly less (p=0.048). There was no statistical significant difference between the two dressing in terms of epithelization. (p =0.676).

Keywords: Collagen Dressing; Vaseline Group.

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Introduction

Wounds are as old as human history. Wound dressings date back to 5000 BC. Rational, cost effective selection of the appropriate dressing can be confusing. From a clinical stand point, the three primary issues that should guide selection of a wound dressing are:

1. Nature of the wound, namely, a sutured wound, a wound with a partial thickness skin loss, or a wound with a full thickness skin loss.
2. Amount of serous exudates produced.
3. Amount of wound infection or contamination.

Split thickness skin grafting is one of the most common operations in plastic surgery. The wound left at the donor site after harvesting a split skin graft is a partial thickness skin loss, which produces low level of exudates, and is not infected and not contaminated.

The issues in the management of the donor site after harvesting a spilt thickness skin graft are taking care of discomfort and pain prevent sepsis, and promote primary healing with minimal scarring. Various materials can be used for donor site dressing, namely, Vaseline gauze, Collagen sheet, and Polyurethane film and hydrocolloid dressings like calcium alginate, hydro-colloid membranes and fine mesh gauze.

Collagen dressing

Collagen and its role in wound healing have been described by Ethridge et al [1].

Biological dressings like collagen are impermeable to bacteria, and create the most physiological interface between the wound surface and the environment. Biological dressings like collagen dressings have other advantages over conventional dressings in terms of ease of application and being natural, generally non-immunogenic, non- pyrogenic, hypo-allergenic, and pain reduction.

Moreover, these are easy to apply and have the additional advantages of haemostatis. collagen sheet once adherent to the wound has low friction between the wound surface and the dressing and this make the collagen suitable for awkwardly sited donor sites [2]. They also observed that collagen dressing does not require a bulky dressing, which would hamper mobilization

In a more recent publication, Ramakrishnan et al reported 853 children of burns treated between 1992-2011. Of these 487 were treated with various types of collagen dressings [3]. Cullen et al. also described the beneficial properties of collagen for wound healing [13].

In normal wound healing, special enzymes called Matrix Metallo Proteinases (MMP's) break down the damaged or malformed collagen, Wounds often become chronic when too many MMPs are present, but when a wound dressing containing collagen is used, the MMPs are kept busy in breaking down that collagen, and the body's own healthy collagen is protected. The use of collagen dressing has been found to inhibit the action of metalloproteinase [14].

Collagen sheets not only promote angiogenesis, but also enhance body's repair mechanism [15]. Collagen provides anti-infective, anti-inflammatory, anti-fibrotic and analgesic properties. It promotes angiogenesis [18].

Vaseline gauze dressings

Vaseline gauze dressing is recognized as a standard treatment for split thickness skin graft donor sites. It is considered to be non-adherent, but nevertheless it usually sticks to the wound surface while it absorbs exudates. Early removal of the dressing may lead to skin maceration or wound infection and newly formed epithelium may peel off, accompanied by aggravation of local pain and wound deepening [27].

Vaseline gauze is basically simple fine meshed gauze soaked in white petrolatum, more commonly known as petroleum jelly. Vaseline gauze is non-adherent fine mesh and this property reduces pain and trauma during dressing changes. It clings and conforms to all body contours, and it remains moist, is non toxic, not an irritant, and does not evoke an allergic response. Vaseline gauze dressing provides moist environment to the wound and the moist environment causes quick migration of keratinocytes to the wound and thus promotes epithlialization [3].

Strongly hydrophilic that acts by continuously absorbing moisture from the air, and it produces the feeling of wetness on the skin [4].

The air flow through the dressing allows the exudates to dry and dressing may form a hard crust. Removal of the dressing then often results in considerable pain and damage to new epithelium [24].

The fine mesh used in the Vaseline Gauze allows the egress of fluid. As the dressing dries, fibrin from the wound bed causes temporary binding of the dressing of the wound and re-epithlialization proceed beneath it [25].

Aims and Objectives of Study

Primary Objective

To compare the healing of a donor site wound produced after harvesting a split skin graft when using a collagen sheet dressing versus a dressing with Vaseline gauze.

Secondary Objectives

1. To assess the difference in pain between the two methods of dressing.
2. Difference in soakage

Material & Methods

The Study was carried over a period of two years in the Department of Plastic Surgery, tertiary care hospital at New Delhi from September 2010 to August 2012.

The study population consisted of subjects requiring a split skin graft for a burn, for a raw area after trauma or local sepsis.

It was a prospective observational study. The patients were blinded to the type of dressing applied on the donor area till the dressing change.

The study protocol was approved by the institutional ethics committee prior to commencement of the study. Informed written consent was obtained from every patient prior to enrollment in the study.

Inclusion Criteria

1. Patients requiring a Split Skin Graft (SSG) for a wound of surface area of more than 150 square cm.
2. Patient of either sex
3. Patient undergoing elective surgery on clean and clean contaminated wound
4. STSG with thigh as donor area.
5 Surgery under G.A/spinal

Exclusion Criteria

1. Patient of Diabetes Mellitus and hypertension
2. Cutaneous disorder
3. Immune compromised patients
4. Patients failing to follow-up to 90 days since the day of operation.

Methods

A total of 40 patients were selected the study. Amongst this Vaseline Gauze was used to dress the donor site of STSG in 20 patients. In the other 20 patients, Collagen dressing was used. All grafts were taken from anterior and lateral aspect of thigh. The patient was prepared for surgery by keeping him/her fasting over night. Their part from which split thickness skin graft was proposed to be taken was thoroughly scrubbed with povidone iodine and draped with sterile sheets. Grafting handle was adjusted for harvesting split thickness skin graft. Amount of graft to be harvested depended on percentage of raw area that needed to be covered. After harvesting split thickness skin graft in 20 patients, the donor site was dressed with Vaseline gauze and in another 20 patients donor site was dressed with the collagen dressing. This was charted on the respective Performa sheet of the patient. For collagen dressing one or more collagen sheets of appropriate size were selected. Collagen sheets were rinsed in normal saline before application. Sheets were applied firmly so as to cover the whole raw area of donor site. This was facilitated by using the back of the thumb-forceps to apply a little pressure from one end of the dressing to the other. Care was taken to avoid air bubbles under the sheet. Subsequently they were covered by a layer of gauze and then 2 layers of gamjee dressings, and a crepe bandage was applied. Vaseline or paraffin gauze was easier to apply, and was also similarly covered with 2 layers of gamjee pads after a layer of gauze and held in place by a crepe bandage.

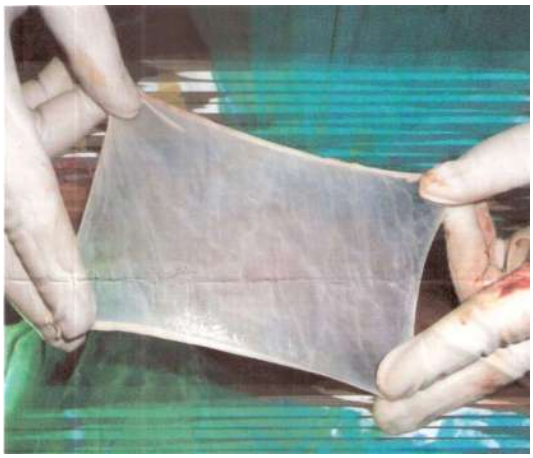


Fig. 1: Sheet of Collagen to be used over donor site

Fig. 2: Donor site With Vaseline gauze

Observations and Results

The total number of participants in this study were 40, of which 20 were treated by a dressing with Vaseline gauze (group V), and another 20 by dressing with collagen sheets (group C), it was observed that the mean age of the patients under group V was 38.25±14.65 while mean age of the patients under group C was 42.40±12.85. Further, it was observed that there was no statistically significant difference in the age group distribution between the two groups (p=0.347).

It was observed that under the group V, 50% of the patients were females while 50% were males. Under the group C, males and females were also equally distributed i.e. there were 50% males and 50% females.

Further, it was observed that there was no significant difference in the sex distribution between the two groups. (p=1.0).

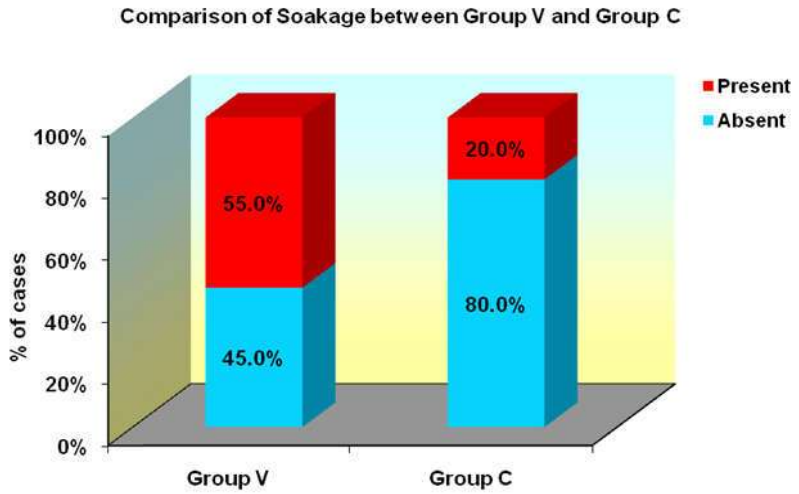
The most common reason for skin grafting in the study group was deep accidental burns and road traffic accident.

Pain in First 24 Hours.

Table 1: Comparison of VAS between Group V and Group C

VAS	Group V		Group C		P Value
	Frequency	%	Frequency	%	
VAS<=5	3	15.0%	14	70.0%	0.001*
VAS>=6	17	85.0%	6	30.0%	
Total	20	100%	20	100%	

The initial VAS score of patients receiving collagen dressing was significantly less than the low pain those receiving Vaseline dressing. At the end of 24 hours 70% of collagen group were graded as low pain, while in the Vaseline group only 15% fell into group. This was a significant difference (p=0.001). There was also highly significant decrease in pain score 48 hours post harvest day in both collagen and Vaseline dressing groups and pain intensity remained almost same in both collagen and Vaseline dressing after this period



Graph 1:

Soakage on Day 7

Table 2: Comparison of Soakage between Group V and Group C

Soakage	Group V		Group C		P Value
	Frequency	%	Frequency	%	
Present	11	55.0%	4	20.0%	0.048*
Absent	9	45.0%	16	80.0%	
Total	20	100%	20	100%	

Each patient after harvesting of graft had a primary dressing of either Vaseline gauze or collagen sheet. This was covered with a secondary dressing of 2 layers of gamjee. The inspection of dressing was done on the 7th day. The presence of discharge in the outer layer of secondary dressing was recorded. If the soakage involved the 2nd or outer gamgee layer it was taken as positive for soakage. We noted that collagen treated donor site showed less soakage as compared to Vaseline dressing. Table 2 show that 11 out of 20 Vaseline treated donor site (55%) showed soakage as compared to Collagen treated donor site which showed only 4 out of 20 with soakage present (20%).

The data obtained was analyzed and subjected to the test of statistical significance using Chi square test. The soakage under collagen dressing was significantly less (p=0.048).

Epithelialization on Day 14

Table 3: Comparison of Epithlialization on Day 14 between Group V and Group C

Epithelialization on Day 14	Group V (n=20)		Group C (n=20)		P Value
	Frequency	%	Frequency	%	
E1 = < 50%	2	10.0%	1	5.0%	0.676
E2= 50-75%	2	10.0%	1	5.0%	
E3=75-100%	16	80.0%	18	90.0%	
Total	20	100%	20	100%	

Epithlialization was considered to have occurred when the primary dressing of Vaseline or collagen separated easily from the donor wound site, without producing bleeding, and leaving an intact pink donor surface. The inspection was done on the 14th day to assess the epithlialization. The primary dressing was raised from the bed and the process of healing was categorized as follows:

- Healing between 75% and 100%, when this amount of primary dressing peeled easily from the donor site.
- Healing between 50% and 75% when this amount of primary dressing peeled easily.
- Healing <50%, when this amount of primary dressing peeled easily.

On the 14th day, 16 Vaseline Gauze treated donor sites showed 75 to 100% epithlialization (80%) as compared to 18 (90%) collagen dressing treated donor sites. Thus the donor sites treated with collagen epitheilalized earlier than Vaseline dressing treated donor sites.

The data was analyzed and subjected to the test of statistical significance using Chi Square test .There was no statistical significant difference between the two dressing in terms of epithelisation (p =0.676).

Discussion

Tissue repair and wound healing are complex processes that involve inflammation, granulation, and remodeling of the tissue. Wound healing is delayed in presence of wound infection. The aim of dressing a wound is to keep it covered in order to avoid contamination, provide a suitable environment for healing and protect it from further trauma. The role of dressing a wound cannot be underestimated in the management of wounds.

In search of an ideal wound dressing, our study encompassed comparison between Vaseline Gauze

treated donor site and Collagen dressing treated donor site (split thickness). An ideal split thickness graft donor site dressing should be easy to apply, promote rapid re- epithelisation, and pain free, infection free, and relatively inexpensive.

In my study, 40 patients who needed split thickness graft for treatment of wounds, were divided in to two group randomly. Each group had 20 patients and we used the Vaseline dressing and Collagen dressing in each group on the donor site for split thickness skin grafting. There was no statistically significant difference in the demographic data, such as sex, age and educational level .Each method of dressing was examined for pain ,epithelisation time and soakage

Pain

Out of 20 patient treated with Vaseline dressing 17 patients (85%) showed VAS score of > 6 as compared to Collagen dressing treated donor site, which showed VAS score >6 only in 6 cases (30%) in the first 24 hours. VAS score of <5 was found only in 3 case (15%) in Vaseline dressing as compared 14 case of (70%)of Collagen dressing. VAS score was almost equal after 48 hour of dressing in both dressing .A uniform policy of analgesic requirement was followed for each group. The above data was statically studied and was found to be highly significantly (p=0.001) Collagen dressing create the most physiological interface between the wound surface and the environment. Collagen dressing have other advantage over conventional dressing in terms of ease of application and being natural, non –immunogenic, hypo –allergic, and pain free.

The probable reason could be its COX-1 inhibition which is the enzyme implicated for pain.

Soakage on the 7th Day

Out of 20 patients treated with Vaseline dressing, soakage was present in 11 patients (55%) as compared to Collagen dressing treated donor site of 4 cases (20%). Soakage was absent in 9 case (45%) of Vaseline group treated population as compared to 16 case (80%) of collagen treated donor site. The Pvalue was found to be significant (0.048)

The discharge from the wound surface was comparatively more in number in Vaseline Gauze treated donor site.

Park SN et al. (2003) documented that Collagen is a biomaterial, when applied to the donor site, not only promote angiogenesis, but also enhances the body' s repair mechanisms. While acting as a mechanical support these reduces edema and loss of fluid from the wound site along with facilitation of migration of fibroblast in to the wound and enhances the metabolic activity of the granulation tissue.

Epitheilialization on 14th Day

We found out in our study that 16 (80%) out of 20 cases, epithelization was 75-100% (E3) in Vaseline Gauze treated wounds on the 14th post operative day as compared to Collagen treated group which showed 75-100% epithelization in 18 (90%) out of 20 populated collagen dressing, And there was not a statistically significant difference (p=0.676)

L Lloyd, J. F. Kennedy et al., 1998, reported that carbohydrate polymers maintained a moist environment and stimulates healing.

Lia Van Rijswijk, 1994, documented that moisture is essential for keeping a healthy and ideal environment for wound healing and dry gauze dressing soak up the vital fluid and rob the wound of the growth factors and enzyme required for healing. Winter 29 proposed his classic hypothesis that the optimum environment for epithelisation is moist. Collagen is a biomaterial that encourages wound healing through deposition and organization of freshly formed fiber and granulation tissue in the wound bed thus creating a good environment for wound healing.

Collagen components such as fibroblast and keratinocyte are fundamental to the process of process of wound healing and skin formation. Wound dressing such that Collagen products create a biological scaffold matrix that supports the regulation of extracellular components and promotes wound healing.

Summary and Conclusion

Our study was undertaken to find an ideal wound dressing. lt included 40 patients who needed skin grafting for some reason. These were divided randomly in to two groups. In 20 patients Vaseline dressing were used, and in remaining 20 patients collagen dressing were used. Following conclusions were drawn from the study:

1. Collagen dressing was easier to apply, soft, adhered over the surface very smoothly and didn't get stuck with the overlying absorbent dressing, although it is a subjective finding.
2. Pain intensity remains less in collagen dressing donor site as compared to Vaseline treated donor site
3. Collagen dressing minimizes drying out and adherence.
5 Collagen dressing treated wounds has less soakage.
6 Collagen treated wounds epitheilalized earlier.

By the above noted conclusions collagen dressing fulfills all the properties of an ideal wound dressing.

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