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Original Research Article

A comparative study between hydrocolloid dressing and conventional vaseline gauze dressing in healing of donor site wound in split skin graft

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ABSTRACT

Background: One of the frequently performed procedures by plastic surgeons, and general surgeons is skin graft. Pain in the donor region is a typical patient complaint. Paraffin dressing usually covers the area of the skin graft donor location. Split-skin grafting is commonly used by surgeons to treat skin abnormalities in the event of ulcers, deep burns and subsequent trauma. Epidermis harvesting and upper 1/3rd of dermis resulting in a wound called donor site wound (DSW) are needed for the technique of split-skin graft harvesting. These wounds pose a sort of burden to patients during the procedure and after the wound healing process. These injuries tend to cause immense discomfort, are at risk of infection, and may cause scratching of the patient (pruritus) and cosmetic inconvenience. Care and management of local donor site wound (DSW) should aim to create an environment that promotes early epithelialization for the patient with shortened hospital stay period with minimal pain and discomfort. This study was done to evaluate effectiveness of hydrocolloid dressing in comparison to paraffin gauze dressing in healing of split skin graft donor site wound, and in comparing the parameters like pain, pruritis, requirement of analgesics of donor site wound.
Methods: The study was done on 50 patients, 25 as study group who received effectiveness of hydrocolloid dressing and 25 as paraffin gauze dressing.
Results: Statistics proved that study group (hydrocolloid dressing) had lesser pain than control group (paraffin gauze dressing).
Conclusions: The hydrocolloid dressing on skin graft donor area reduces pain in post-operative period.

Keywords: Hydrocolloid, Dressing, Paraffin gauze, Post-operative pain, Skin graft, Pruritis

INTRODUCTION

Dressings

Dressings have been used to promote the healing process since antiquity. An understanding of tissue repair and knowledge of the properties of available dressings is needed for the choice of which dressing to use for a particular wound. To help in wound care, there are already hundreds of dressings on the market.

There is always no simple best option, and it is important to consider the pros and cons of each dressing modality.[1]

The hydrocolloids

The term hydrocolloid is used to describe a dressing family comprising a matrix of hydrocolloids composed of materials such as gelatin, carboxymethylcellulose, and pectin. Hydrocolloid dressings are available as wagers or as pastes or powders for adhesive use. The matrix absorbs water, swells, and liquefies to form a sticky gel upon contact with wound exudates. The absorption ability of the products varies and may or may not leave residue in the wound. They are distinguished from films by the capacity of hydrocolloids to absorb wound exudates. Otherwise, they share many positive characteristics, including limited

transmission of moisture and gas and bacterial impermeability.

Skin grafting

In the event of ulcers, deep burns and subsequent trauma, split-skin grafting is generally used by surgeons to cover skin defects. The technique of split-skin graft harvesting requires epidermis harvesting and upper 1/3rd of dermis resulting in a wound called donor site wound (DSW). Such wounds appear to cause tremendous pain, are at risk of infection, can cause patient scratching (pruritus) and cosmetic inconvenience. Local donor site wound (DSW) treatment and management should strive to establish an atmosphere that encourages early epithelialization with minimal pain and discomfort for the patient with reduced hospital stay length.[2]

Although the process of split skin grafting is more or less standardized, donor site wound management varies dramatically and is a debatable issue. Therefore, patients complain of pain after split skin grafting, which is much more severe in the wound region of the donor site relative to the receiver site. A variety of materials and products have been recognized for the dressing and treatment of Donor Site Wound (DSW) to resolve this issue.

The most common dressing used at the donor site wound is the use of fine meshed gauze usually smeared with petroleum jelly or bismuth. But if dressings of this kind get soaked due to wound discharge through their entire thickness, it will become a means of bacterial invasion. In addition, displacement of donor site dressing generates shearing forces that impede epithelial cellular migration and cause patient distress in terms of pain. Dressing at the time of its removal would be strongly adherent and more likely to cause damage to the re-grown epithelium.

Need for study

For centuries wounds have been dressed in order to protect the wound from the harmful external environment. Hemostasis aided by a dressing limits blood loss of the dissemination of microbes and toxins, limits edema, reduces pain and improves gas and solute exchange between blood and tissue.[1]

Split skin grafting is been commonly employed by surgeons for covering skin defects in case of healing ulcers, burns wounds and following trauma.[2,3] The wound tends to cause enormous pain and are at risk of getting infected can cause itching (pruritis).[4-6]

Split skin graft donor site wound has been managed with closed or open dressings with the open being obsolete now. The closed occlusive dressing results in very good outcome with considerable reduction in duration of wound healing, good quality of the epithelium which is regenerated along with comfort to the patient. Closed wound dressing also has an advantage of preventing mechanical trauma to donor site wound, microbial contamination and tissue desiccation. Hence closed wound dressing is always preferred over open method which is obsolete as mentioned earlier.[7]

Meshed vaseline gauze is most commonly used in closed wound dressings, dressing will be firmly adherent and more prone to cause injury to the regrown epithelium at the time of its removal.[7,8]

The use of polyurethane film, a semi permeable dressing maintains a moist environment allowing diffusion of oxygen and water vapors while providing a barrier to wound exudates. It has claimed to reduce the healing time and donor site pain and pruritis.[9,10]

Our study aims at comparing the efficacy of use of these newer dressings with meshed vaseline gauze dressing in the management of split thickness skin graft donor site wound.

Objectives of the study

To evaluate effectiveness of hydrocolloid dressing in comparison to paraffin gauze dressing in healing of split skin graft donor site wound, rate of re-epithelialization, pain, pruritis and duration of analgesics required (NSAIDS).

METHODS

Source of data

IPD of General Surgery Department at KIMS Hospital, Bangalore

Methods of collection of data

Study design: Randomized prospective comparative study

Study period: October 2018 to April 2020 (1.5 years).

Place of study: Department of General Surgery, KIMS Hospital, Bangalore.

The sample size has been estimated using the GPower software v. 3.1.9.2

Considering the effect size to be measured (d) at 81% for Two-tailed Hypothesis with 95% Confidence Interval, power of the study at 80% and the margin of the error at 5%, the total sample size needed is 50. Each group will comprise of 25 samples [25 × 2 = 50 samples].

Inclusion criteria

Adult patients with >18 years, patient willing to give informed consent, DSW after SSG harvest for any indication, size measuring not more than 20*20 cms and healing ulcers less than 2% of body surface area.

Exclusion criteria

Patient not willing to give informed consent, age less than 18 years, immunocompromised state and malignancy, local irradiation.

After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria will be enrolled for the study after obtaining informed consent.

After harvesting split skin graft using humby's knife of thickness 0.2 to 0.3mm, DSW is mopped with a sterile mop and is covered with saline gauze for hemostasis.

Then hydrocolloid dressing is put over the donor site with tincture benzoin as an adhesive to normal skin edges then covered with normal cotton roll and followed by gauze roll dressing.

Examination of the dressing of donor site wound is made on 6th,10th and 14th post-operative day for any soakage.

Any soakage on 6th post-operative, will do super padding of dressing.

On 14th post-operative day donor site wound is opened to assess the re-epithelialisation status.

Assessment tools

Scale of measurement for re-epithelialization

1= complete epithelialization (60-100%), 2= scattered or spotty epithelialization (60%-80%), 3= no epithelialization or infected (<50%). Wound inspected on 6th,10th,14th POD.

Assessment of pain using VAS (visual analogue scale) is measured as (0–10).

Pruritus over donor area can also be assessed using simple numeric scale from (0-10). Assessed in a patient held diary similar way as pain assessment daily at the end of one week.

Duration of need of analgesics and type of analgesics (NSAIDs): 0 = no need, 1 =1-3 days, 2 =4-7 days, 3 =8-10 days, 4 ≥10 days.

Outcome measures

Re-epithelialization of the total wound surface, assessment of pain using VAS, Pruritis over donor area, duration of need of analgesics and type of analgesics (NSAIDS).

Statistical analysis

Statistical Package for Social Sciences [SPSS] for Windows Version 22.0 Released 2013. Armonk, NY: IBM Corp., will be used to perform statistical analyses.

Chi Square Test was used to compare the Pruritis and type of analgesics used between 02 groups.

And any other relevant test, if found appropriate during the time of data analysis will be dealt accordingly.

RESULTS

According to the Table 1, on the basis of age the mean age of the paraffin gauze is 48.56 and SD is 16.45, while is the hydrocolloid dressing the mean of age is 53.80 and SD is 16.58. The p value is 0.31.

Table 1: Distribution on the basis of age and sex.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		P value
		Mean	SD	Mean	SD	
Age (years)	Mean and SD	48.56	16.45	53.80	16.58	0.31[a]
	Range	26-75		20-78		
		N	%	N	%	
Sex	Males	20	80%	21	84%	0.71[b]
	Females	5	20%	4	16%	

Table 2: Comparison of aetiology between 2 study groups using chi square Test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 value	P value
		N	%	N	%		
Aetiology	Cellulitis	1	4	0	0	4.490	0.11
	Diabetic foot	11	44	18	72		
	Traumatic	13	52	7	28		

According to the Table 2, hydrocolloid dressing: the aetiology for the required skin graft included in hydrocolloid group, trauma in 07 (28%) patients, cellulites in 00 (00%) patients, Diabetic foot in 18 (72%) patients. Paraffin gauze: in paraffin gauze group aetiology include trauma in 13 (52%) patients, cellulites in 01 (04%) patients and Diabetic foot is 11 (44%) patients. The chi-square value is 4.490 and the p value is 0.11.

According to the Table 3, the p value of comparison of presence of comorbidity condition between 2 study groups is 0.04 which is highly significant.

Table 3: Comparison of presence of comorbidity condition between 2 study groups using chi square test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 value	P value
		N	%	N	%		
Comorbid conditions	T2DM	4	16	8	32	16.512	0.04*
	HTN	1	4	0	0		
	T2DM+HTN	2	8	8	32		
	T2DM+HTN+IHD	3	12	0	0		
	T2DM+IHD	0	0	2	8		
	T2DM+CKD	0	0	1	4		
	T2DM+Hypothyroidism	1	4	0	0		
	T2DM+HTN+IHD+CKD	1	4	0	0		
	Nil	13	52	6	24		

*Statistically significant.

Table 4: Comparison of mean Hb (gm%) and serum albumin levels between 2 study groups using independent student t test.

Parameters	Group	N	Mean	SD	Mean diff	t	P value
Hb	Paraffin gauze dressing	25	11.20	2.00	-0.52	-0.890	0.38
	Hydrocolloid dressing	25	11.72	2.13			
Serum Albumin	Paraffin gauze dressing	25	3.28	0.35	-0.05	-0.500	0.62
	Hydrocolloid dressing	25	3.34	0.39			

Table 5: Comparison of donor site between 2 study groups using chi square test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 value	P value
		N	%	N	%		
Donor site	Left thigh	12	48	10	40	0.325	0.57
	Right thigh	13	52	15	60		

Table 6: Comparison of graft size (in CMS) between 2 study groups using chi square test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 Value	P value
		N	%	N	%		
Graft size	10 x 10 cm	14	56	11	44	21.646	0.001*
	10 x 15 cm	2	8	0	0		
	10 x 20 cm	1	4	0	0		
	15 x 15 cm	5	20	0	0		
	15 x 20 cm	2	8	0	0		
	20 x 10 cm	0	0	1	4		
	20 x 20 cm	1	4	13	52		

*Statistically significant.

According to the Table 4, paraffin gauze: the mean of paraffin gauze dressing of Hb (gm %) is 11.20 and SD is 2.00. Hydrocolloid dressing: the mean of hydrocolloid dressing of Hb (gm%) is 11.72 and SD is 2.13. The value of independent student t test between the comparison of two groups is -0.890. The p value of two groups is 0.38.

The comparisons of serum albumin levels between 2 study groups are- paraffin gauze: the mean of paraffin gauze dressing of Serum Albumin levels is 3.28 and SD is 0.35. Hydrocolloid dressing: the mean of hydrocolloid dressing of serum albumin levels is 3.34 and SD is 0.39. The value of independent student t test between the comparison of two groups is -0.500. The p value of two groups is 0.62.

According to the above Table 5, it is revealed that the comparison of donor site between 2 study groups are- paraffin gauze: the patient of left thigh donor is 12 (48%) and right-side donor is 13 (52%), hydrocolloid dressing: the patient of left thigh donor is 10 (40%) and right-side donor is 15 (60%). The chi-square value is 0.325 and the p value is 0.57.

According to the Table 6, it is revealed that on the basis of comparison of graft size (in CMS) between 2 study groups are- paraffin gauze: the graft size in 10 x 10 cm is 14 (56%), 10 x 15 cm is 02 (08%), 10 x 20 cm is 01 (04%), 15 x 15 cm is 05 (20%), 15 x 20 cm is 02 (08%), 20 x 10 cm is zero and 20 x 20 cm is 01 (4%). Hydrocolloid dressing: the graft size in 10 x 10 cm is 11 (44%), 20 x 10 cm is 01 (04%) and 20 x 20 cm is 13 (52%). The chi-square value is 21.646 and the p value is 0.001 which is statistically significant.

Table 7: Comparison of intensity of pain between 2 study groups using chi square test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 value	P value
		N	%	N	%		
Pain	Mild	2	8	11	44	11.604	0.003*
	Moderate	13	52	12	48		
	Severe	10	40	2	8		

*Statistically significant.

Table 8: Comparison of presence of pruritus over donor area between 2 study groups using chi square test.

Variable	Category	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 value	P value
		N	%	N	%		
Pruritus	Mild	6	24	16	64	8.476	0.01*
	Moderate	15	60	8	32		
	Severe	4	16	1	4		

* - Statistically significant.

Table 9: Comparison of mean duration of need of analgesics during post-operative period (in days) between 2 study groups using independent student t test.

Parameters	Group	N	Mean	SD	Mean Diff	t	P value
Analgesics consumption	Paraffin gauze dressing	25	5.12	0.93	1.40	5.741	<0.001*
	Hydrocolloid dressing	25	3.72	0.79			

* - Statistically significant.

Table 10: Comparison of re-epithelialization between 2 study groups using chi square test.

Variable	Category (%)	Paraffin gauze dressing		Hydrocolloid dressing		χ^2 Value	P value
		N	%	N	%		
Re-epithelialization	40-50	2	8	0	0	23.600	<0.001*
	50-60	5	20	0	0		
	60-70	12	48	3	12		
	70-80	6	24	14	56		
	80-90	0	0	8	32		

* - Statistically significant.

According to the Table 7, it is revealed that on the basis of comparison of comparison of intensity of pain between 2 study groups are- paraffin gauze: the mild group patients is 02 (08%), moderate group of patients is 13 (52%) and severe group of patients is 10 (40%). Hydrocolloid Dressing: the mild group patients is 11 (44%), moderate group of patients is 12 (48%) and severe group of patients is 02 (08%). The chi-square value is 11.604 and the p value is 0.003 which is statistically significant.

According to the Table 8, it is revealed that on the basis of comparison of presence of pruritus over donor area between 2 study groups are- paraffin gauze: the mild group patients is 06 (24%), moderate group of patients is 15 (60%) and severe group of patients is 04 (16%). Hydrocolloid dressing: the mild group patients is 16 (64%), moderate group of patients is 08 (32%) and severe group of patients is 01 (04%). The chi-square value is 8.476 and the p value is 0.01 which is statistically significant.

According to the above Table 9, comparison of mean duration of need of analgesics during post-operative period (in days) between 2 study groups are- paraffin gauze: the mean in paraffin gauze dressing is 5.12 and SD is 0.93. Hydrocolloid dressing: the mean of hydrocolloid group is 3.72 and SD is 0.79. The value of student t-test between the comparisons of two groups is 5.741. The p-value of two groups is <0.001 which is highly significant.

According to the above Table 10, we can compare the re-epithelialization between paraffin group and hydrocolloid group.

Paraffin gauze: in paraffin gauze the category of re-epithelialization in 40-50% group of patients is 02 (08%), 50-60% is 05 (20%), 60-70% is 12 (48%), 70- 80% is 06 (24%) and 80-90% is zero.

Hydrocolloid dressing: in hydrocolloid dressing the category of re-epithelialization in 60-70% is 03 (12%), 70-80% is 14 (56%) and 80-90% is 08 (32%).

The chi-square value for Comparison of Re-epithelialization between 2 study groups is 23.600. The p value for comparison of re-epithelialization between 2 study groups is 0.001 which is statistically significant.

DISCUSSION

Due to its easy application, convenience, low risk of infection, and minimal cost, surgeons have been using paraffin gauze dressing as the primary option for the coverage of split-skin donor sites for many years. In several different essential ways, however, it has been found inferior; it is a painful, adherent dressing. Thus, the donor sites do not tend to heal easily. Hydrocolloids can be used on wounds with low to moderate exudation and are available in various shapes and sizes. They are easy to apply. This enables them to be used where higher versatility is needed.[10]

Therefore, the purpose of this study was to evaluate the effect of hydrocolloid dressing on split thickness skin grafting donor sites in terms of pain and wound healing versus paraffin gauze dressing.[11]

The results of the study indicate that the majority of the study sample was male. Their ages were between the ages of (50-65) years. This sample characteristic homogeneity can help to encourage wound healing.[13]

Women in the younger group had substantially greater (i.e. slower healing) wounds than men.[14,15]

Skin grafting is a surgical technique that involves removing, or transplanting, skin from one region of the body to another area of the body. If a portion of the body has lost its protective covering of the skin due to burns, injury, or disease, this operation may be performed.[16] Traumatic wounds, release of scar contracture, as well as congenital skin deficiencies. Skin graft for burns and traumatic wound injury, such as external fixation, was performed in this study for cases transferred from orthopedics.[17] In terms of average healing time for Hydrocolloid and paraffin gauze dressing, this was the typical skin graft indication among the studied sample. Many studies have shown that there is no statistically significant difference in the mean time between hydrocolloid dressing and paraffin gauze dressing for wound healing.

Our sample population consisted of a male population of 21 (84%) and a female population of 4 (16%). The mean age of the sample population was 53.80 for the mean age of hydrocolloid dressing, and 16.58 for SD. The age distribution of the sample population was clustered between the ages of 50 and 65 years of age.

Because of the hydrocolloid's physical property, this quicker healing is impermeable to liquid bacteria and viruses. Exudates are consumed quicker by the inner layer of hydrocolloid. A consistently high rate of moisture vapor transmission is given by the breathable outer layer. Together, these features reduce the risk of damage to healthy peri-wound skin and provide extended wear for up to seven days in an ideal moist wound environment.

The level of pain on day 3 is mild in 09 patients in the hydrocolloid group and 01 patients in the paraffin group, while pain on day 5 is moderate in 03 patients (12%) and 04 patients (16%) in the paraffin group, while in extreme pain there is only 02 (8%) in the hydrocolloid group and 07 (28%) in the paraffin group. There are no patients in Hydrocolloid dressing on the 6th day of dressing, but there are 04 (16 percent) patients in the paraffin community in mild pain and extreme pain in 05 (20 percent) patients. After evaluating the data, we can conclude that there is no patient on the 6th day in the Hydrocolloid group, but in the paraffin group there is a patient with mild pain and extreme pain. So, we can assume that the group of hydrocolloids is stronger than the group of paraffin's.

It was noted that the patient handled the hydrocolloid dressings much better than paraffin gauze dressings, as pain evaluation was an objective in this study. The pain evaluated on the basis of Visual Descriptive Scale (VDS) on the 6th post-surgical day during dressing removal, results show, no hydrocolloid group patients. Moderate pain in 04 (16%) and extreme pain in 05 (20%) patients in the paraffin gauze group.

Compared to the paraffin gauze group, the cost of treatment was higher in the hydrocolloid group. However, it was noted that more analgesics were required by the paraffin gauze community, and early mobilization was affected. On the basis of the above analysis, it can be concluded that hydrocolloid dressings achieve faster donor site epithelialization and are supportive dressings, reducing discomfort when the dressing is removed.

Due to its ease of application, convenience, low risk of infection, and minimal cost, mesh paraffin gauze dressing has for years been the key preference of surgeons for the coverage of split-skin donor sites. In many other important aspects, however, it has been considered inferior: it is a painful, adherent dressing under which donor sites do not tend to heal quickly.

The overall wound healing was faster with Hydrocolloid than with Paraffin gauze dressing, as calculated by the percentage of re-epithelialized dermis. Its physical characteristics can partially explain the faster re-epithelialization rate that has been seen with the Hydrocolloid dressing. Between the 2 dressings, there was also no difference in wound secretion, bleeding, or wound infection. In both classes, the frequency of infection was also similar. In this research, it was noted that the patients handled the hydrocolloid dressings much better than the paraffin gauze dressings, and they were also noted to be much easier to remove or alter compared to the paraffin gauze dressings that became adherent to the wound surface and caused discomfort and pain during removal and early mobilization was affected. Although cost-effectiveness was not assessed in this review, earlier studies conducted in this regard concluded that postoperative morbidity was reduced by the faster healing, less discomfort and less scarring identified with hydrocolloid treatment, which in turn affects global cost-effectiveness. On the basis of the above study findings, it can be inferred that hydro-colloid dressings achieve faster donor site epithelialization and are thus superior to paraffin gauze dressings.

CONCLUSION

The analysis carried out concludes that hydrocolloid assists in quicker healing at the split thickness skin graft donor region than the traditional paraffin mesh dressing. During dressing removal and during the post op period, hydro colloid causes less pain than paraffin dressing at the split thickness of the skin graft donor region. No differentiation has been shown between the two classes about complications. Compared with paraffin gauze dressing, hydrocolloid dressing resulted in shorter healing time, quicker re-epithelialization, less dressing changes and decreased discomfort. So, we can infer that hydrocolloid dressing is superior to normal paraffin gauze dressing.

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