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Research Article

Comparison of amniotic membrane vs paraffin gauze dressing on skin graft donor site for second and third degree burn

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Abstract: Skin grafting is one of the commonest procedures performed in patients having skin loss after burn, trauma and malignancy. Pain is one of the major drawbacks of dressing and is the main complain within first 10 days after graft harvest. Amniotic membrane is more beneficial in reducing the duration of healing as well as cause less pain after surgery. But data is scarce available in this regard. Objective: To compare the outcome at the donor site of split thickness skin graft among Paraffin Gauze Dressing vs Amniotic Membrane Study design: Randomized Control trial. Setting: Burn and Plastic Surgery Department, Bolan Medical Complex Hospital, Quetta. Sampling technique: Non-probability, Consecutive sampling ***Methodology***: Total 60 patients fulfilling the inclusion criteria were enrolled in the study. Total burn surface area (TBSA) was calculated. Patients were divided randomly into two groups. In Group A Patients Split thickness skin Graft donor site was managed with a paraffin gauze dressing. In group B, amniotic membrane was applied on donor sites of Split thickness skin Graft site. Amniotic membrane was taken from Gynecology & Obstetrics department and was processed with antibiotic and stored in glycerol solution. Wound healing was assessed by operating surgeon clinically. ***Results***: Mean age of patients in this study was 40.98±11.59 years. In Paraffin gauze dressing group, there were 15 (50%) males and 15 (50%) females while in Amniotic membrane group there were 17(56.7%) males and 13(43.3%) females. Mean pain score in paraffin gauze dressing group was 4.86±0.97 while in Amniotic membrane group was 5.06±1.20. Mean duration of wound healing was 18.08±3.22 days. There was significant difference in the mean duration of wound healing in both groups. ***Conclusion***: Amniotic membrane provides significant benefits by increasing patients' comfort through decreasing the duration of wound healing and reducing pain as compared to Paraffin Gauze dressing.

Keywords: Split thickness skin graft, Paraffin Gauze Dressing, Amniotic Membrane .

INTRODUCTION

The process of surgically helping patients with burn injuries involves removing non-viable skin, followed by skin grafting of viable skin.1 Skin grafting is one of the frequently practiced processes involving patients who lose skin due to either trauma, cancer, or burn injuries. The main sites of harvesting skin are thigh skin, skin of the abdomen, skin of the buttock region, and scalp skin, as the healing process of transplanted skin occurs through the migration of epidermal cells, which originate from hair follicle shafts and surrounding structures remaining in the dermis.2 The skin harvested must be protected against damage and dehydration.3 The result of harvesting full thickness skin grafts includes creating a fresh wound at the graft site, which is very painful due to nerve endings exposed in the dermis; thus, there must be rapid healing of this skin.4

Unfortunately, pain is a significant drawback associated with this type of dressing, and it remains the first complaint recorded by patients for the first 10 days after harvesting the graft. However, recently, new advanced dressings have been developed that help decrease pain associated with harvesting, especially in cases where immediate rehabilitation is necessary for a favorable outcome. Various new dressings that offer less pain and comfort compared with traditional dressings include hydrocolloids, silver dressings, alginate dressings, biocomposite porcine type I collagen dressings, artificial skin, and polyurethane dressings. A major drawback associated with hydrocolloid dressings is that a scab forms over the wound, in addition to exudates that give a pungent smell and cause skin maceration.5

From the comparative study between the effectiveness of amniotic membrane and the use of Vaseline-impregnated gauze in the healing process of the wounds, it was revealed that the average healing time of the intervention group (amniotic membrane dressing) recorded 17.61±2.56 days, while in the control group (Vaseline-impregnated gauze dressing) it averaged 21.16±3.45 days.6

In a study, a comparison was made between two groups: one using amniotic membrane, while the other used general dressing. The result showed that there was a significant decrease in pain scores in the amniotic membrane group, with a P-value of 20.05, recording a score of 3.06, whereas in the control group, it was 4.15.7

MATERIALS AND METHODS

Upon getting clearance from the ethical committee of Hospital and Research Evaluation Unit of CPSP, a total of 60 patients satisfying inclusion criteria was be selected for the study. Along with preoperative details, postoperative demographic information of patients was including Name, Age, Sex, TBSA. The total body surface area (TBSA) was be calculated by Lund & Browder chart. Patients were then randomly divided into two groups through Lottery System. In Group A, the donor site of split thickness skin graft was dressed with paraffin gauze dressing. This was removed on the 15th postoperative day. In group B, amniotic membrane was be applied on donor sites of Split thickness skin Graft site and was be assessed after 10 days. Amniotic membrane was be taken freshly from department of Gynecology and Obstetrics department after a cesarean section after written consent from donor. These donor patients were be screened for HIV, hepatitis B and hepatitis C. This membrane was be processed with antibiotic and stored in glycerol solution. Wound healing was be assessed by operating surgeon clinically.

All the data would be coded and analyzed using SPSS version 23. Mean and std. deviation would be calculated for the healing period of wound and pain score, age, TBSA. Frequency would be calculated for gender (Male/Female) and degree of burn. Independent Sample t-test would be used to compare mean healing period and pain between the two groups. P-value of ≤0.05 would be taken as significant. Data would be stratified for age, gender, TBA. Post stratification. P-value of ≤0.05 would be taken as significant.

RESULTS

Mean age of patients in this study was 40.98±11.59 years. Mean Total body surface area of the patient in this study was 19.08±4.58 the minimum Total body surface area was 10 and maximum was 25. Table-1

The mean age of the patients in Paraffin gauze dressing group was 40.98±11.59 years the minimum age was 16 years and maximum was 58 years while in Amniotic membrane group mean age of the patients 41.60±12.32 years the minimum age was 16 years and maximum was 60 years. Table-2

In Paraffin gauze dressing group there were 15(50%) males and 15(50%) females while in Amniotic membrane group there were 17(56.7%) males and 13(43.3%) females. Figure-3

There was no significant difference in the pain score in treatment groups in all the age groups i.e. 15-30 years, 31-45 years and 46-60 years as the p-values were not significant. (p-values =0.58, 0.81 and 0.45 respectively) Table-3

There was no significant difference in the mean values of duration of wound healing in treatment in the age group of 15-30 years while there was significant difference in the mean values of duration of wound healing in treatment groups in the age groups of 31-45 years and 46-60 years. Table-4

There was no significant difference in the mean values of pain score in treatment groups among both males and females as the p-values were not significant. (P-values=0.82 and 0.092). Table-5

There was significant difference in the duration of wound healing in treatment groups among both males and females as the p-values were significant. (p-values = 0.004 and 0.001). Table 6

There was no significant difference in the mean values of pain score in treatment groups for all the groups of total body surface area i.e. 10-15, 16-20 and 21-25. (p-values=0.38, 0.70 and 0.74 respectively). Table-7

There was no significant difference in the mean values of duration of wound healing in treatment groups in the total body surface area of 10-15 (p-value=0.112) while there was significant difference in the mean values of duration of wound healing in treatment groups in the total body surface area groups of 16-20 and 21-25. (p-values=0.004 and 0.010 respectively). Table-8

Table-1: Descriptive statistics for Age of patient's Total Body Surface area of patients

N	**60**	**60**
Mean	**40.98**	**19.08**
SD	**11.59**	**4.58**
Minimum	**16**	**10**
Maximum	**60**	**25**

Table-2: Age of patients in Treatment Groups

	Paraffin gauze dressing	**Amniotic membrane**

N	**30**	**30**
Mean	**40.36**	**41.60**
SD	**10.98**	**12.32**
Minimum	**16**	**16**
Maximum	**58**	**60**

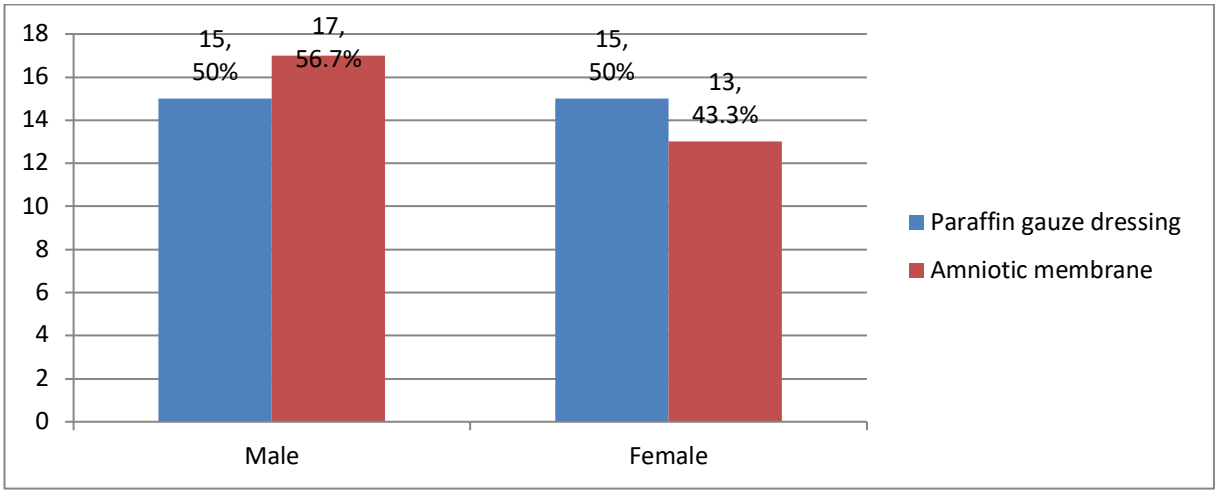

Figure -3: Gender distribution in Treatment Groups

Table-3: Comparison of pain score in treatment groups stratified for age

Age	Treatment Group	n	Mean	SD	p-value
15-30	Paraffin gauze dressing	5	5.50	0.54	0.580
	Amniotic membrane	5	5.50	0.54	
31-45	Paraffin gauze dressing	14	4.57	0.85	0.811
	Amniotic membrane	12	4.66	1.15	
46-60	Paraffin gauze dressing	11	4.90	1.13	0.453
	Amniotic membrane	13	5.30	1.37	

Table-4: Comparison of duration of wound healing in treatment groups stratified for age

Age	Treatment Group	n	Mean	SD	p-value
15-30	Paraffin gauze dressing	5	16.60	2.96	0.194
	Amniotic membrane	5	19.80	4.08	
31-45	Paraffin gauze dressing	14	16.07	2.86	0.013
	Amniotic membrane	12	19.00	2.69	
46-60	Paraffin gauze dressing	11	16.63	2.37	0.001
	Amniotic membrane	13	20.53	2.47	

Table-5: Comparison of pain score in treatment groups stratified for Gender

Age	Treatment Group	n	Mean	SD	p-value
Male	Paraffin gauze dressing	15	**4.86**	**1.12**	**0.82**
	Amniotic membrane	17	**4.76**	**1.30**	
Female	Paraffin gauze dressing	15	**4.86**	**0.83**	**0.092**
	Amniotic membrane	13	**5.46**	**0.96**	

Table-6: Comparison of duration of wound healing in treatment groups stratified for Gender

Age	Treatment Group	n	Mean	SD	p-value
Male	Paraffin gauze dressing	15	**16.73**	**2.76**	**0.004**
	Amniotic membrane	17	**20**	**3.14**	
Female	Paraffin gauze dressing	15	**16**	**2.53**	**0.001**
	Amniotic membrane	13	**19.53**	**2.50**	

Table-7: Comparison of Pain score in treatment groups stratified for Total body surface area

TBSA	Treatment Group	n	Mean	SD	p-value

10-15	Paraffin gauze dressing	5	5.00	1.00	0.38
	Amniotic membrane	9	5.55	1.13	
16-20	Paraffin gauze dressing	12	4.41	0.90	0.70
	Amniotic membrane	10	4.60	1.26	
21-25	Paraffin gauze dressing	13	5.23	0.92	0.74
	Amniotic membrane	11	5.09	1.13	

Table-8: Comparison of duration of wound healing in treatment groups stratified for Total body surface area

TBSA	Treatment Group	n	Mean	SD	p-value
10-15	Paraffin gauze dressing	5	15.60	3.57	**0.112**
	Amniotic membrane	9	15.88	2.08	
16-20	Paraffin gauze dressing	12	16.58	2.81	**0.004**
	Amniotic membrane	10	20.10	2.18	
21-25	Paraffin gauze dressing	13	16.46	2.22	**0.010**
	Amniotic membrane	11	20.27	3.82	

DISCUSSION

The amniotic membrane was first utilized as a skin substitute in 1910; three years later, it was applied to cover small skin wound defects.8 Despite the passage of a century, surgeons still face challenges in widely adopting this material as a suitable wound dressing. The situation becomes more complex when considering the ideal coverage for split-thickness skin graft donor sites. Various materials have been created for dressing these donor sites. Nevertheless, these advancements have led to ongoing debates in clinical practice.9 The optimal dressing choice for a split-thickness donor site graft should aim to shorten healing time, lower the rate of wound infections, and enhance patient comfort.10 A significant concern is the risk of infection at the donor site, which can transform a partial defect into a full-thickness skin loss, akin to a third-degree burn.11 Therefore, the use of antibiotic dressings on the wound site is deemed essential, provided it does not hinder the healing process.7 Epithelialization occurs more rapidly when a moist environment is maintained at the wound site.12 Additionally, employing a closed dressing reduces the likelihood of dehydration, trauma, and contamination.13 Occlusive dressings are also believed to shield the exposed nerve endings of the donor site from air, thereby minimizing the buildup of metabolites and resulting in reduced pain sensation.14

The pain score was greater in the control group than the intervention group, representing a better cooperation when amniotic dressings were exchanged in comparison with the routine dressings.7

According to Eskandarlou 2016 biologic dressing lead to significant reduction of pain score at the site of skin graft in the first few days after surgery.9 Whereas in our study the pain score was almost similar in both the groups i.e. Paraffin gauze dressing (control group) and Amniotic membrane (Interventional Group)with no significant difference in p-value. (p-value=0.48) Less pain sensation during removal of wound dressing has also been pointed out in the literature 194 with special emphasis on the fact that an open wound coverage loses its pliability when it dries, imposing more pain.15

Amnion prevents the wound from irritation, evaporation, dryness and also nerve ending stimuli on the wound surface. These characters could not be seen in routine dressings. In the first 24-48 hours after any skin abrasion, skin harvesting or even primary repair in surgical wounds, basal epithelial cells can cause a water tight closure in wound layer together with migration and mitosis processes.16

This layer does not have enough strength against external mechanical stresses and is fragile. With disruption of this fine neoepithelium, underlying nerve endings are exposed and suffered with contact to nonbiological dressings. But after fifth day of graft taking, epithelialization reaches to optimal thickness and resistance in order to preserve its integrity against external stress. Therefore, pain score of both studied and control site did not show any difference after this time.

Less pain at the first few days of skin harvesting is important. Patients could be mobilized soon and the need for analgesia during hospitalization is decreased and subsequent complications in respiratory and coagulation system are prevented.17
Another study has reported fewer needs to the exchange of wound dressing when the amniotic membrane has been applied. This benefit could probably decrease the pain that is sensed by the patients during dressing change.7

Another study reported that the duration of wound healing was shorter in the amniotic membrane group as compared to Occlusive dressing group these findings are similar to the findings of our study as in our study duration of wound healing was shorter in amniotic membrane group (Mean: 16.36±2.63) as compared to Paraffin gauze dressing group (mean: 19.80±2.84). The healing process has been showed to be facilitated in wounds dressed by amniotic membrane.18

Branski et al.19 in their cohort study also reported similar findings they reported that the amniotic group had a shorter duration of healing compared with other dressing

materials. Similarly, the epithelialization rate is faster in partial burn wounds treated with amniotic membrane.20

Maral et al.21 have indicated that the amniotic membrane facilitates wound healing at donor sites. Although Atanassov et al. have showed a duration of 15 days for reepithelialization of donor site wounds, such a process in another study reproted as long as 17 days in donor sites dressed with amniotic membrane 7 while in our study this duration was 18 days which is almost similar with the above-mentioned study.

The variation may result from differences in thickness and size of the graft, patient's age and health condition, and the anatomical donor site. Also, the need for reserved frozen amnions is not avoidable in many conditions; besides, by this approach, multiple local burn centers are able to have access to the processed amniotic material to make wide application of amniotic wound dressing possible. In addition to the mentioned benefits of the amniotic dressing in split-thickness skin grafting, this material has showed promising cosmetic results at the wound sites.22-23

Conclusion

It is concluded that amniotic membrane due to ease of preparation as well as absence of adverse effects is recommended to use in the site of skin graft in order to be harvested in burn patients as compared to Parrafin Gauze dressing because amniotic membrane provides significant benefits by increasing patients' comfort through decreasing the duration of wound healing and reducing pain.

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