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ORIGINAL ARTICLE

Compare the Mean Duration of Healing with Sodium Carboxylic Methyl-Cellulose Silver Dressing Versus Standard Petroleum Gauze Dressing for Management of Second-Degree Burns

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ABSTRACT

Introduction: Burn injury is one of the most devastating and serous form of trauma that man sustains. Millions of people all over the world are hospitalized each year for treatment of burns and thousands die. It is estimated that in UK alone 10000 burn victims are hospitalized each year and 700 die.

Objective: To compare the mean duration of healing with sodium Carboxylic methyl- cellulose silver dressing versus standard petroleum gauze dressing for management of second-degree burns.

Material and methods: A total of 100 patients of second-degree burns were selected for this study. Clinical examination of patients was done to find out the degree of burns. In group A, Aquacel Ag dressing was applied. In group B, petroleum gauze dressing was applied. Patients were evaluated on each visit when dressing was changed for complete healing.

Results: The mean age of the patients was 33.4±19.2 years. Duration of healing when compared in both the groups its showed that average time of healing in group A was 10.38+2.71 while in Group B it was 13.48+5.26SD and it showed significant difference with p-value=0.000.

Practical Implications: This study will help to find the best method used for healing in second-degree burns.

Conclusion: Mean duration of healing with sodium Carboxylic methyl-cellulose silver dressing was less than petroleum gauze dressing for management of second-degree burns.

Keywords: Burn, Injury, Tissue, Wound, Healing, Management, Dressing

INTRODUCTION

Burn injury is an impairment of the tissue, which is caused by extreme heat, electricity, chemicals, friction or radiation. The severity of burns is influenced by several factors. The mechanism of the injury, length of time, depth and range of the burns, age, and general wellbeing of the child are important factors.[1] Burns can be classified by damage to the skin layers and extent of affected skin. Partial thickness or second-degree burns (blisters covering a red base) reach the deeper skin layers, extending to the whole epidermis and the dermis.[2] Burns are classified according to depth. Superficial partial-thickness and mid-dermal partial-thickness burns can be expected, or have the potential, to heal spontaneously.[3] Basic experiments have demonstrated that the effect of wound healing in moist environments is better than that in dry environments.[4]

Aquacel Ag dressing can be easily removed during hydrotherapy. The wound pain is reduced. By changing the dressing just twice a week, the wound can be directly evaluated, decreasethe odor and increasethequalityoflifeofthe patients. In addition, lower frequency of dressing changes decreases the manpower requirements and is cost effective.[5,6]Aquacel Ag® (ConvaTec, Princeton, NJ, USA) is a new hydrofiber wound dressing consisting of soft non- woven sodium carboxymethylcellulose fibers integrated with ionic silver.[7] It is a moisture-retention dressing, which forms a gel on contact with wound fluid and has antimicrobial properties of ionic silver.[8,9]

One trial found that the mean duration before complete healing was 10.3±2.5 days with Aquacel Ag dressing (n=10) while 16.3±4.8 days with petroleum gauze dressing (n=10). There was a significant difference between groups with regard to healing time ($p < 0.05$).[10] But another trial found that the mean duration before complete healing was 10.05±2.3 days with Aquacel Ag dressing (n=20) while 10.35±2.8 days with petroleum gauze dressing (n=20). There was an insignificant difference between groups with regard to healing time ($p > 0.05$).[11]

Rationale of this study is to compare the mean duration of healing with Aquacel Ag dressing versus standard petroleum gauze dressing for second degree burns. Aquacel Ag is newly introduced method for management of second degree burns, and is in current practice in developed countries. Literature has showed that Aquacel Ag is more effective in reducing duration of healing than standard petroleum gauze. In local setting, petroleum gauze is still in use. But this may be due to lack of local evidence and also the above stated studies in favor of Aquacel Ag dressing are outdated, no current study available in this regard.[12] So we want to conduct this study to conduct this study to get the evidence regarding efficacy of Aquacel Ag for management of second degree burns. So that in future we can implement the use of Aquacel Ag instead of standard petroleum gauze. This will help to improve our practice and local guidelines for use of Aquacel Ag in local setting, which also reduce the cost and time of treatment.

Objective: To compare the mean duration of healing with sodium Carboxylic methyl- cellulose silver dressing versus standard petroleum gauze dressing for management of second-degree burns.

MATERIAL AND METHODS

This Randomized Controlled Trial was conducted in Department of Plastic Surgery, Burns and Plastic Surgery Centre, Peshawar during September 22, 2020 to Mar 21, 2021.

Sample Size: Sample size of 100 cases; 50 cases in each group is calculated with 80% power of test, 95% confidence level and taking magnitude of mean duration of healing i.e. 10.3±2.5 days with Aquacel Ag dressing and 16.3±4.8 days with petroleum gauze dressing

Sampling Technique: Non probability consecutive sampling.

Inclusion Criteria: Patients of age 16-75years of either gender presenting with second degree burns (as per operational definition) presenting within 6 hours

Exclusion Criteria: Diabetes mellitus (BSRR>200mg/dl), and those taking immunosuppressant drugs, e.g. corticosteroids (on medical record), inhalation injury, presence of full-thickness burns necessitating surgical debridement, cellulitic, or infected wounds, and percentage total body surface area involvement > 40% (on clinical examination)

Data Collection Procedure: After approval from ethicalcommittee, 100 patients fulfilling selection criteria was enrolled in the study through emergency of Department of Plastic Surgery, Burns and

Plastic Surgery Centre, Peshawar. Informed consent was obtained. Demographic variables including name, age, gender, duration of burn, site of burn and body surface burned were also noted. Then patients were randomly divided in two groups by using lottery method. In group A, Aquacel Ag dressing was applied. In group B, petroleum gauze dressing were applied. Burn was washed with saline and a thin layer of MEBO® (petroleum gauze) was applied over the burned areas of the face. Burns were washed with saline, sheets of dressing were applied directly to the wound, with an overlap of 2 cm extending over non-burned surrounding skin. Sheets will be secured in place with an outer sterile dressing (two layers of gauze with a thin layer of cotton in between), while the outer dressing was secured with Surgi-net®. After every three days, dressing was changes until healing. Patients were followed-up in OPD till complete re-epithelization. Patients were evaluated on each visit when dressing was changed forcomplete healing. Duration of healing was noted (as per operational definition). Proforma was used to collect the information.

Data Analysis: The data were analyzed using SPSS version 21. The quantitative variables like age, duration of burn, body surface are burned and duration of healing were presented as mean ± SD. The qualitative variables like gender, site of burn was presented as frequency and percentage. Both groups were compared by using independent samples t-test. P-value ≤ 0.05 was taken as significant. Data were stratified for age, gender, duration of burn, site of burn and body surface burned. Post-stratification, both groups were compared by using independent samples t-test. P-value ≤ 0.05 was taken as significant for each strata with P-value ≤ 0.05 taken as significant.

RESULTS

This study was carried out at the Department of Plastic Surgery, Burns and Plastic Surgery Centre, Peshawar. A total of 100 patients with second degree burns were included in the study. The patients were divided in to 2 groups; group A and B each having 50 patients. Patients in whom Aquacel Ag dressing applied were allocated to group A and those in whom petroleum gauze dressing was used were allocated to groupB.

Table 1: Distribution of patients byAge (n=100)

		Group		Total	p-value
		Group A	Group B		
Age (in years)	<= 20.00	17 34.0%	16 32.0%	33 33.0%	0.487
	21.00 - 40.00	7 14.0%	12 24.0%	19 19.0%	
	41.00 - 60.00	23 46.0%	21 42.0%	44 44.0%	
	61.00+	3 6.0%	1 2.0%	4 4.0%	
Total		50 100.0%	50 100.0%	100 100.0%	
Mean±SD		34.4±20.1	32.30±18.3	33.4±19.2	

Figure 1: Scald burns in one year old child. Dermo epidermal burns. At 1 hour of burns

Figure 2: Scald burns in 1.5 years old child. Washed and cleaned. Aquacel Ag dressing at 3rd day of its application. Dry and adherent to wounds.

Figure 3: Scald burns forearm deep dermal wounds treated with AquacelAg dressing healing wounds at 11th day of application of dressings.

The overall mean age of the patients was 33.4±19.2 years. There were 17 (34%) patients in the age range of less than 20 years, 7 (14%) patients of age range of 21-40 years, 23 (46%) patients of age range of 41-60 years and 3 (6%) patients of age range of more than 60 years of age. while the similar pattern was found in group B. the age distribution was insignificant with p-value= (Table 1).

There were 34 (68%) male and 16 (32%) female patients in group A while 33 (66%) male and 17 (34%) female patients in group B. the gender wise distribution in both the groups was insignificant with p-value=0.487 (Table2).

Table 2: Distribution of patients bysex (n=100)

		Group		Total	p-value
		Group A	Group B		
Gender	Male	34 68.0%	33 66.0%	67 67.0%	0.832
	Female	16 32.0%	17 34.0%	33 33.0%	
Total		50 100.0%	50 100.0%	100 100.0%	

Table 3: Distribution of patients by Site ofburn (n=100)

		Group		Total	p-value
		Group A	Group B		
Site of Burn	Arms	26 52.0%	22 44.0%	48 48.0%	0.775
	Legs	16 32.0%	17 34.0%	33 33.0%	
	Face	6 12.0%	7 14.0%	13 13.0%	
	Trunk	2 4.0%	4 8.0%	6 6.0%	
Total		50 100.0%	50 100.0%	100 100.0%	

In the distribution of patients by site of burn show that majority of the patients were burn on their arms followed by legs, there were 26 (52%) of patients burn at arms, 16 (32%) patients burn over legs, 6 (12%) patients burn on face and 2(4%) burn on trunk. While the similar pattern was observed Group B the site of burn was also insignificant among both the group with p-value=0.775. (Table 3)

In the distribution of patients by duration of burn and body surface area in both the groups showed insignificant results. Which clearly shows that these biased were controlled among the groups. Duration of healing when compared in both the groups its showed that average time of healing in group A was 10.38+2.71 while in Group B it was 13.48+5.26SD and it showed significant difference with p-value=0.000 which shows that aquacel Ag dressing required lesser time to heal the burn wound as compared to petroleum gauze in patients with second degree burn. (Table4)

Table 4: Distribution of patients by duration of burn, body surface area burn, duration of healing

Group	N	Mean	Std. Deviation	p-value
Duration of Burn GroupA GroupB	50 50	2.0400 1.9800	75485 76904	0.695
Body Surface Area Burn Group A GroupB	50 50	5.0340 5.2600	1.32166 1.37113	0.403
Duration of Healing GroupA GroupB	50 50	10.3800 13.4800	2.70970 5.26924	0.000

Stratification of duration of healing over age, duration of burn have insignificant results while body surface area burn and duration of healing shows significant results in both the groups. (Table 5)

Table 5: Stratification over age (n=100)

		Group			
		Group A		Group B	
		Duration of Healing (in days)		Duration of Healing (in days)	
		<= 10.00	11.00+	<= 10.00	11.00+
Age	Count	32	18	20	30
	Mean	36.91	30.06	33.85	31.27
	SD	19.95	20.24	16.67	19.60
	p-value	0.2520		0.6311	
Duration of Burn	Count	32	18	20	30
	Mean	2.13	1.89	2.20	1.83
	SD	.87	.47	.95	.59
	p-value	0.2848		0.0953	
Body Surface Area Burn	Count	32	18	20	30
	Mean	4.34	6.26	4.40	5.83
	SD	.55	1.41	.53	1.46
	p-value	0.000		0.0001	
Duration of Healing	Count	32	18	20	30
	Mean	8.69	13.39	8.90	16.53
	SD	1.09	2.00	.97	4.71
	p-	0.000		0.000	

Stratification over gender and site of burn shows insignificance except the male gender, in which duration of healing shows significance.

DISCUSSION

Burns represent one of the major health problems in Pakistan. Burns may be thermal (flame), scald, electrical, or chemical. Though the burns mortality has decreased in the recent past owing to the ongoing medical and surgical advances, nevertheless, the burn injuries are still associated with significant mortality and morbidity.[10] On the other hand, massive burns are still a challenge to the burn team with, normally, a high mortality. In a developing country like Pakistan, burn injuries continue to be a challenging problem due to poor medical facilities, lack of specialist doctors, and absence of public awareness.[11] An extensive burn adversely affects both patient's and his family's psyche. Also the costs involved in treatment of burn patients are exorbitantly high.[12]

Burn injury is one of the most devastating and serous form of trauma that man sustains. Millions of people all over the world are hospitalized each year for treatment of burns and thousands die. It is estimated that in UK alone 10000 burn victims are hospitalized each year and 700 die.[13-15]

Second degree burn involves epidermis and dermis. Survival of burn injury is related to age, size of burn and presence of inhalation injury.[16] Other variables include site, associated injury and pre-existing disease and poor compliance also play important roles. In our study the mean age of the patients was 33.4±19.2 years.[17-19] As compared with the study of Jamil et al[63] the mean age of the patients was 25 years, which is comparable with our study. In another study conducted by Gupta et al[20] the mean age of the patients was 35 years, which is comparable with ourstudy.[21-22]

CONCLUSION

Developing country like Pakistan needs an aggressive public awarenessthrough media and newspapers so that people become more literate about various etiological factors and complications causing burns and means of preventing them. This evidence-based study suggests that the use of sodium Carboxylic methyl-cellulose silver dressing dressing's results in a significant decrease in wound healing time as compared to petroleum gauze dressing. All the above-reported results strongly indicate that hydrogel products are effective and safe in wound management. Furthermore, there is a need for high-quality and multi-center RCTs are suggested to help clinicians to make informed decisions on the best options for patients suffering from skin wounds.

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