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ORIGINAL ARTICLE

Comparative Study of the Efficacy of Conventional and Collagen Dressing in First and Second Degree Superficial Burns

Vishakha Iyer[1], Sarojini Jadhav[2], Suyash Deshmukh[3]

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ABSTRACT

Introduction: Burns injury is one of the most common cause for hospitalization in the world. About 80% are first degree and second degree ones. Since paediatric skin has a faster rate of healing, superficial first and second degree burns have significant improvement. Recent advances show that collagen dressing in burns because of its biological properties have better outcomes reducing morbidity.

A prospective, interventional observational study was conducted over 120 paediatric patients with less than 30% superficial burns dividing them in 2 groups (collagen and conventional dressing). The analgesic need, infection rate, rate of epithelialization, scarring, need for grafting and hospital stay were assessed. Chi square test was applied to obtain 'p' value to decide significance.

70 patients were offered collagen and 50 patients silver sulfadiazine(SSD) dressing. The mean rate of epithelialization with collagen and SSD dressing was 9.50 days and13.92 days respectively. The mean days for analgesic need was 4.02 days with collagen and 6.22 days with SSD dressing. Sterile culture at 1 week was seen in 88.57% patients with collagen and 52% patients with SSD. With collagen dressing healthy scarring was seen in 82.85% patients and with SSD dressing, 32%. Of 50 patients with SSD dressing 2 required skin grafting. Collagen rejection was seen in 4 of 70 patients. With collagen dressing the average hospital stay was 7.18 days and with SSD dressing, 12.10 days.

AUTHOR'S AFFILIATION:

[1] Assistant Professor, Department of General Surgery, Government Medical College and Hospital, Chhatrapati, Sambhajinagar, India.

[2] Professor and HOD, Department of General Surgery, Government Medical College and Hospital, Chhatrapati, Sambhajinagar, India.

[3] Junior Resident, Department of General Surgery, Government Medical College and Hospital, Chhatrapati, Sambhajinagar, India.

Corresponding Author:

Vishakha Iyer, Assistant Professor, Department of General Surgery, Government Medical College and Hospital, Chhatrapati, Sambhajinagar, India.

E-mail: vishsi@yahoo.com

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Collagen dressing showed lesser analgesics, faster epithelialization, lesser antibiotic use, healthy scarring, lesser hospital stay.

KEYWORDS

• Paediatric • Burns • Collagen • Conventional • Superficial • Biological • Silver sulfadiazine • Epithelialization • Scarring

INTRODUCTION

Burns injury is found to be one of the most common cause for hospitalization in the world. Statistics shows a ratio that about 1 in 100000 population suffered from burns injury in the world.[1] It was convenient to classify burns dressing into three categories based on the material it is made up of i.e. 1) conventional, 2) biological, 3) synthetic skin substitute. Conventional dressings included substances like honey, potato peels, banana leaves, ointments like povidone iodine, silver sulfadiazine and covers like bactigauze. Biological dressings include amniotic membrane preparations. Biological dressings however were difficult to obtain and proved to be expensive. hence, synthetic skin substitutes came into picture like collagen sheets that were cost effective, easily available and results were found to be similar to biological ones.[2] Since paediatric skin has a faster rate of healing, it was observed that the superficial first degree and second degree burns showed a significant improvement. Recent advances have shown that collagen dressing in burns patients have better outcomes like decreased pain, hospital stay thus reducing morbidity. Collagen dressing provides adequate moisture as it is biological covering. Along with moisture it also helps attaining haemostasis and prevents bacterial invasion providing an interface between the environment and the wound leading to decreased infectivity and faster healing.[3]

The present study is conducted on paediatric patients to study the efficacy of collagen dressing versus conventional dressing.

AIMS AND OBJECTIVES

Aims: To study the efficacy of collagen versus conventional dressing in first and second degree Superficial Burns with less than 30% total body surface area of burns. Objectives: To study the efficacy in terms of 1. need for analgesics, 2. Rate of epithelialization, 3. Rate of infection, 4. Scarring 5. Need for surgical intervention, 6. Hospital stay and cost effectivity in the two groups patients.

MATERIALS AND METHODS

Synopsis approval was obtained from Ethical committee. All patients below the age group of 12 years admitted under burns unit will be screened and those with less than 30% TBSA of scald and flame burns were consented and enrolled in the study from October 2017 to March 2019. Total of 120 patients were enrolled based on inclusion and exclusion criteria. The percentage of burns was calculated by Lund and Browder chart.[13] They were given local wound care depending upon the availability. When collagen was available from health scheme at our institute, collagen dressing was applied and when collagen was not available, conventional dressing was given i.e. silver sulfadiazine. A prospective, interventional observational study was conducted over these patients. The first dressing in case of collagen dressing was changed on day 5 and in case of silver sulfadiazine was changed on day 2 or depending upon soakage. The parameters in the objectives (need for analgesia, rate of epithelialization, rate of infection, scarring, need for grafting and hospital stay) were assessed. All the parameters were compared, and Chi square test was applied to obtain the 'p' value which was then decided is significant or not.

INCLUSION CRITERIA

All patients with 1. Less than 12 years of age 2. Less than 30% first and second degree superficial burns. 3. Scald and flame

burns 4. Presented within 24 hours of injury. 5. Consented for participation in study.

EXCLUSION CRITERIA

All patients with 1. More than 12 years of age 2. More than 30% surface area of burns 3. Presented after 24 hours of injury 4. Deep burns 5. Electric and chemical burns 6. Respiratory system involvement 7. Patients with associated conditions like head injury, fractures and other comorbidities or medical conditions. 8. Did not give consent for participation for study

RESULTS

The study was conducted in 120 patients(n) of paediatric age group with less than 30% TBSA of burns. They were divided into two groups on the basis of the type of dressing available and given; Group A, the Collagen group and Group B, the Conventional group. After conduction of the above study, data was derived depending upon the following observations.

It was observed that highest number of patients belonged to the age group of 0-4 years(80) followed by in 5-8 years(24) and then 9-12 years(16). Of these 62 were male and 58 were females.

RESULT AND DISCUSSION

The present study included a total of 120 patients, out of which 70 were offered collagen dressing and 50 of them were offered conventional dressing. The patients were divided into 3 age groups, 0-4 years, 5-8 years and 9-12 years which included 80, 24 and 16 patients respectively. In 0-4 years age group.

1) Need for analgesia: (table 1)

In collagen group, the mean days for analgesic requirement was 4.02 days which was significantly lesser than in conventional group which was 6.22 days. Studies by Mohammad Khurram *et al*[5] Barret *et al*[8], and Milind A Mehta *et al*[9] where paediatric population was considered with superficial thickness burns, and comparative study was done between collagen and conventional dressing, it was seen that the pain score decreased faster with collagen dressing availing decrease in the need for analgesics. this was supportive to the present study.

In studies by Wasaik *et al*[10] and Pham *et al*[11] where a general population was considered, similar findings were encountered that the requirement of analgesics was less in case of collagen dressing as compared to conventional dressing.

Table 1: Mean days of requirement of analgesics

Type of wound dressing	Mean days for analgesics	Std. Deviation	P value
Collagen (n = 70)	4.0286	1.43427	
Conventional (n = 50)	6.2200	1.65727	0.0001
Total	4.9417	1.87103	

The p value = 0.0001, i.e. less than 0.05, hence the difference between the requirement of analgesia in the two groups is statistically significant.

2) Rate of epithelialization: (table 2)

The mean rate of epithelialization in the collagen group was 9.50 days and that in conventional group was 13.92 days which was significantly more than with collagen.

The studies by Mukta Waghmare *et al*[3], Aaron P. Lesher *et al*,[4] and Mohammad Khurram *et al*[6] Juan P Barret et al[8] and Milind A Mehta *et al*[9] were based on use of collagen in paediatric age group with upto 30% burns. these studies go in accordance with the present study.

In studies where generalized age group was considered with upto 30% burns like Wasaik *et al*[10], Pham *et al*[11] and Vloeman *et al*[12], John Hansbrough *et al* and John Greenwood *et al* similar findings were noted i.e. collagen dressed wounds had faster rate of epithelialization.

In a comparative study by Srinivasrao *et al* it[13] was observed that with collagen dressing the rate of epithelialization was 13.07 days which was close to the rate with conventional dressing in the present study. This difference was because of the inclusion of 31-40% burns in their study which was excluded from present study.

Table 2: Mean days for epithelialization

Type of wound dressing	Mean days for epithelization	Std. Deviation	P value
Collagen (n = 70)	9.5000	2.70667	
Conventional (n = 50)	13.9200	3.01588	<0.0001
Total	11.3417	3.57511	

The p value <0.0001, i.e. less than 0.05. therefore difference between the mean rate of epithelialization with collagen and conventional dressing is statistically significant.

3) Incidence of infection: (table 3)

All the patients admitted were assessed for sterile culture obtained at 1 week. There was 88% sterile swab at 1 week in collagen group and 52% in conventional group.

Similarly the results of study conducted by Onkar Singh *et al*[8] in 2011 in India, Cong fan *et al* in Singapore in 2014[15] and Dr. K. Srinivasrao *et al*[13] in 2017 go in accordance with the present study.

However, in a review article by Heyneman *et al* their observation stated that there was no significant difference in the rate of sterile culture obtained when other dressing materials were used instead of silversulfadiazine.[16]

Table 3: Sterile Culture At 1 Week

Type of dressing	Collagen dressing		Conventional dressing	
	no	%	no.	%
Sterile culture at 1 week	62	88.57	26	52
Total (n)	70	100	50	100

P value = 0.000053, i.e less than 0.05, hence data of sterile culture obtained after 1 week with the two types of dressings is statistically significant.

4) Correlation of healthy scarring with the type of dressing used: (table 4)

In the present study, 82.85% patients with collagen dressing had healthy scarring while only 32% patients developed healthy scar with conventional dressing.

Studies conducted in the past by Frank et al and Dr. K. Srinivasrao et al has observed similar outcomes with conventional and collagen dressing in case of scarring.[13]

Table 4: Healthy Scarring

Type of dressing	Collagen dressing		Conventional dressing	
	no.	%	no.	%
Healthy scarring	58	82.85	16	32
Total (n)	70	100	50	100

P value = 0.0001, i.e. less than 0.05, hence data of healthy scarring with the two types of dressings is statistically significant.

5)Need for grafting (table 5)

In the present study, out of 50 patients who were given conventional dressing, 2 of them needed skin grafting for non healing wound while in case of collagen dressing group out of 70 patients none of them needed skin grafting .

In a study by Juan P. Barret et al where a group of 10 paediatric patients in each group i.e. biobrane and silver sulfadiazine, none of them had wound infection and none of them required split skin grafting which was in contrast to the present study.[8]

In a study by Cong fan et al, the outcome was in accordance with our study i.e. none of the patients with collagen dressing required skin grafting.[15]

Table 5: Split skin grafting required

Type of dressing	Grafting needed
Collagen (n = 70)	0
Conventional (n = 50)	2

P value = 0.049, i.e less than 0.05, thus statistically significant i.e. the need for grafting is seen more with use of conventional dressing.

6) Collagen rejection

With collagen dressing 4 of them had collagen rejection which were then managed by conventional dressing i.e. the rejection was 5.7%. In a study by Mohammad Khurram in 2016-17 in India in paediatric population less than 5 years, the collagen rejection was seen only in 2 patients out of 25 patients with collagen dressing going in accordance with the present study.[5]

7) Hospital stay

In the present study, mean hospital stay with collagen dressing was 7.18 days while with conventional dressing it was 12.10 days as per the data provided in table no.6. The hospital stay with collagen dressing was significantly lesser compared to that with conventional dressing.

In similar studies conducted by Mohammad Khurram *et al*[5] Juan P Barret *et al*[8], Sophia *et al*[14] and Cong Fan *et al*[15] the outcome were in favour of the collagen dressing where the hospital stay was lesser supporting the present study.

Studies by John Greenwood *at al*[17] and Stephen Delatte *et al*[18] concluded that increased hospital stay was observed in collagen based dressing burns possibly due to non adherence of collagen over the wound.

Table 6: Mean duration of hospital stay

Type of dressing	Mean hospital stay	Std. Deviation	p value
Collagen	7.1857	3.68032	0.001
Conventional	12.1000	6.40233	
	9.2333	5.53633	

P value = 0.001, i.e less than 0.05, hence statistically significant difference is the hospital stay with the use of the two types of dressing.

Conventional Dressings In Superficial Burns:

Day 7

Day 10

Case 1:

Day 3

Day 10

Case 2:

Case 3:


Day 1


Day 3


Day 7

Collagen dressing in Superficial burns:

Case 1:


Day 5


Day 7


Day 10

Case 2:


Day 1


Day 5


Day 10

Case 3:

Day 5

Day 12

CONCLUSION

In the present study, 120 paediatric patients were enrolled and given collagen and conventional dressing. It was observed that with collagen the mean rate of epithelialization was faster, need for analgesics was minimised, antibiotic use was minimised, healthy scarring was achieved and hospital stay was lesser as when compared to conventional dressing. Considering these factors, it was concluded that collagen dressing was better and more efficient as compared to conventional dressing in paediatric first and second degree superficial burns.

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