



A COMPARATIVE STUDY OF COLLAGEN DRESSING vs CONVENTIONAL DRESSING IN BURN PATIENTS

Dr. Ram Kumar. A	Final Year Post Graduate, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India.
Dr. Ashok Swaminathan*	Associate Professor, Department of Plastic Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India. *Corresponding Author
Dr. G. M. Badhusha Mohideen Ibrahim	Assistant Professor, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India.
Dr. R. Baskaran	Professor, Chief and HOD, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India.
Dr. K. Karthick Raja	Associate Professor, Department of General Surgery, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India.

ABSTRACT

Background : In a low resource setting, burn wounds make a cumbersome clinical entity to manage, with luxury of multiple treatment modalities. In recent times there has many newer and novel modalities to improve disease course.

Aim And Objective- competitive analysis between collagen dressings and conventional dressings in burn wounds using post burn infections and wound healing as parameters.

Methodology - prospective cross sectional descriptive study carried out on patients admitted with first and second degree burns less than 40%. Total 70 patients divided into 2 random groups - 35 in each group - one group received silver sulphadiazine and other group received collagen dressing. On the basis of rate of healing and infections observed.

Results - collagen group had a faster healing rate. Average duration of healing -15.9 days. Infection isolated in collagen dressings were reduced; 5 out of 35 patients with staph Aureus being the most common offending organism.

KEYWORDS : collagen sheets, collagen application, silver sulphadiazine application, burn wound.

INTRODUCTION

Approximately 70 lakh individuals get affected by burn injury each year. 70% of all burn injuries affect the age group of 15-35 years, leading an increased indirect cost as this is the productive age group.^[1] Burns account for an estimated \$1.5 Billion direct costs to annual National Health care as per estimates by the Centre for disease Control and Prevention and a higher economical impact by indirect cost due to sequelae from burn wounds. However, most cases are mild to moderate and often managed on outpatient basis.^[2]

Burn injuries poses a major public health problem in adults as well as children. Frequently burn injuries are divided as thermal, scalds, electrical and chemical burns. Pediatric cases have more severe course as they have thinner skin^[3]

Burn wounds are dynamic wounds where early intervention provides the capacity to limit progression of injury, from partial - thickness burn wound to full thickness wound, by providing moist wound environment with good perfusion and prevent infection.^[4]

The fundamental care in burn wound is to provide a cover for the body to replace lost tissue. Conventional burn wound care involves thorough wound cleaning, debridement of devitalised tissue and providing a favourable environment for healing. Numerous materials have been used with aim of providing a barrier against external contamination and infection, moist environment, provision for gas exchange and limit loss of fluid and electrolytes.

This concept has lead to research in recent years resulting in the invention of biological and synthetic dressings .The result in the use of collagen based covers for burn wounds^[5]. Other synthetic dressings include Biobrane, Trancyte and Integra.

Numerous factors favourable for wound healing are provided, physiological interface between wound and environment by collagen. Collagen is superior to conventional dressings in terms of ease of application and being natural, non immunogenic, nonpyrogenic, hypoallergenic, and pain-free. In addition to Structural scaffolding, collagen control cellular functions, migration and synthesis of many proteins. Moreover it has good compliance and very well tolerated providing promising outcomes with much lesser complications^[6]

Here we assess the efficacy of collagen dressing vs Conventional dressing in burn patients at a tertiary health care centre.

MATERIAL AND METHODS

Study Design

Prospective observational study of patients who have been admitted and undergoing treatment for burns injuries at Rajah Muthiah Medical College Hospital, Chidambaram.

Source Of Data

Study to be conducted among the patients who are undergoing treatment for burns injuries and admitted at Rajah Muthiah Medical College Hospital, Chidambaram during the study period.

Study Period

September 2019 to October 2021.

Inclusion Criteria

- Patients aged <50 years
- Patients having burns of less than 50% TBSA
- Patients having no or mild inhalation injury
- Patients who do not have any cardiopulmonary compromise

- Patients who reached the hospital before the end of 24 hours since injury.

Exclusion Criteria

- Patients aged >50 years
- Patients not willing for study.

After obtaining ethical committee approval, study will be started in Rajah Muthiah Medical College Hospital. Informed written consent from the patients, relatives, parents or guardians were obtained. The 70 patients were randomly divided into test and control populations, 35 in each group. For every patient in the control group, another patient with similar age, sex, TBSA, site of burn was assigned to the test group as far as possible.

Data collection was done using a questionnaire. Relevant history was noted including mode of injury, associated airway injury and associated co morbidities. Total Body Surface Area (TBSA) was calculated by wallace rule of nine or Lund and Browder Charts.

After Primary Surgery and adequate resuscitation all patients were treated with analgesics, intravenous fluids in accordance to parkland's formula- Ringer lactate for adults and Ringer lactate with dextrose saline for pediatric patients. First dose of prophylactic empirical antibiotics (Inj.Cefotaxime 100,g/kg/day, Inj. Metronidazole 15mg/Kg.day) was provided. Tetanus prophylaxis (Inj. Tetanus Toxoid 0.5cc IM) was given. Patients divided randomly into control and study group. Patients in Collagen dressing group were treated with wound cleansing and debridement under IV ketamine followed by wound covered with collagen sheet after thorough washing of sheets with normal saline and then applied over the wound. In the Silver Sulphadiazine (SSD)dressing group daily wound dressing done with 1% silver sulphadiazine ointment application. Wound swab stick specimen were sent for Culture and sensitivity. Pain score was assessed on the first two consecutive days. (Pain Score Tolerable-1, Difficult to tolerate-2, Impossible to tolerate -3) Frequency, percentage, graph was calculated using SPSS trail version 20 software.

RESULTS

In this study, incidence of burn had a bimodal distribution with more frequency in >20-25years age group and >5-10 years age group. In this study the mean age group of study in Silver sulfadiazine dressing in burn patients is 18.2+ 9.52 yrs and mean age group of collagen dressing in burn patients is 19.17+ 9.30 yrs. (table 1) Study shows a higher incidence in females; In SSD dressing subset 26 female patients were present out of 35 patients and collagen dressing group were having 25 female patients. In SSD group - scald burn accounted for 57.2% and flame burn accounted for 42.8%; while in collagen dressing study scald burns accounted for 71.4% and flame burn accounted for 28.6%. (table 2)

In this study, average duration of healing in SSD group patient was 22.08 days; in collagen dressing group patients, it was 15.91 days. P value is 0.001; indicating significant outcome in type of dressing and pace of wound healing (table 3) In this study, 14 patients out of 35 were found pus culture positive in silver sulfadiazine dressing group patients; on the other hand 5 patients out of 35 patients in collagen dressing group were found to isolate an organism.

P value is 0.016; therefore significant association for type of dressing and wound infection (table 4) In SSD group patients 60 % patients showed absence of infected while in collagen dressing 85.7% patients did not get infection. Most common infecting pathogen in this study groups was pseudomonas followed by staph. Aureus. (fig 1)

Table 1: Distribution Of Study Subjects According To Age Group

Age group (years)	Silver-sulphadiazine group		Collagen group	
	No. of patients	Percentage	No. of patients	Percentage
<5	4	11.42	4	11.42
>5-10	6	17.14	4	11.42
>10-15	4	11.42	5	14.28
>15-20	5	14.28	5	14.28
>20-25	8	22.85	9	25.71
>25-30	5	14.28	4	11.42
>30-35	3	8.57	4	11.42
Total	35	100	35	100

Table 2: Distribution Of Study Subjects According To Mode Of Injury

Mode of injury	Silver-sulphadiazine group		Collagen group	
	No. of patients	Percentage	No. of patients	Percentage
Scalds	20	57.2	25	71.4
Flame	15	42.8	10	28.6
Total	35	100	35	100

Table 3: Distribution Of Study Subjects According To Rate Of Healing

Group	N	Mean	Std. Deviation	T	P Value
SSD	35	22.0857	8.39598	3.509	0.001
Collagen	35	15.9143	6.14708		

Table 4: Distribution Of Study Subjects According To Presence Of Infection

Group	Dressing	Infection				Total	
		Absent		Present		No.	%
		No	%	No.	%		
Group	SSD	21	60	14	40	35	100.0
	Collagen	30	85.7	5	14.3	35	100.0
TOTAL		51	72.86	19	27.14	70	100.0

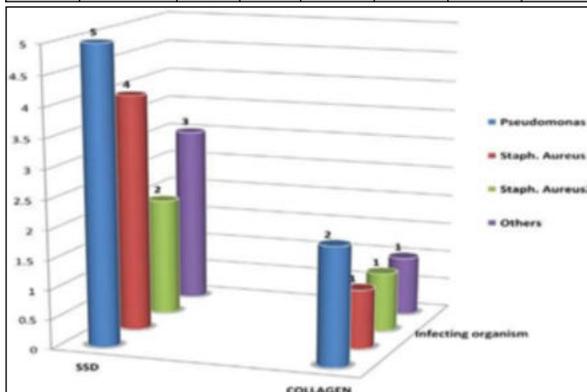


Figure 1: Distribution Of Infecting Organism In Both The Groups Of Burn Patients

DISCUSSION

Collagens are the most abundant and ubiquitous proteins in vertebrates. Collagen has a triple helical structure, and each helix has over 1000 amino acids. The main type of collagen in dermal matrix is Type I collagen. Collagen sheets are derived from bovine collagenous tissue after treating with chemicals and enzymatic procedures. Bovine tissue contain Type I and III collagen. Prepared collagen is cross linked, sterilized and packed.^[7] Collagen improves wound healing by supporting deposition and organisation of freshly formed fibres and granulation tissue providing optimum condition for the healing wound.^[8] In addition to promoting angiogenesis collagen also provides a scaffold for infiltration of

fibroblasts, macrophages, and lymphocytes and monocytes. This removes debris and capillaries form the neovascular network. As healing continues collagen in collagen sheet is replaced by fibroblasts.^[7]The study of Gupta et al(1978), showed duration duration of healing in collagen dressing was 10-14 days^[8].The study of Gerdling et al. in 1988,in patient group with less than 10% burns showed healing time of 10.6 days in comparison to 15 days in SSD group.^[10]This study showed healing rate of 15.91 days in collagen group vs 22.08 days in SSD group.Frank et al. in 1983, demonstrated collagen dressings decreased the rate of bacterial infections.^[12]Yang et al. in 1990,Collagen is inexpensive, adherent, and requires less nursing care.^[13] This study showed low incidence of infection 14.3% in collagen group compared to 40% in silver sulfadiazine dressing. Gerdling et al.^[14] Biological dressings significantly reduce pain, rate of healing, duration of in-patient stay and compliance.Demling and Desanti, et al.^[15], showed bio engineered skin substitute significantly improved healing and outcome of partial thickness facial burns in comparison to conventional open topical ointment method.^[15]

CONCLUSION

Significantly faster rate of healing in collagen dressing group.
Low incidence of wound infection in collagen dressing groups in comparison to conventional group.

REFERENCES

1. J.L Gupta, L.K. Makhija and S.P Bajaj: National programme for prevention of burn injuries Indian J Plast Surg 2010;43:S6-S10.
2. Total burn care by David N. Herndon 3rd edition p1-7.
3. Helvig E. Pediatric burn injuries. AACN Clin Issues Crit Care Nurs 1993;4:433-42.
4. Mariappan N. Collagen dressing for thermal burns. Sch J Appl Med Sci 2015;3:58.
5. Sabiston Textbook of Surgery, 19th edition, p521-37.
6. Park SN, Lee HJ, Lee KH, Suh H. Biological characterization of EDC-crosslinked collagen-hyaluronic acid matrix in dermal tissue restoration. Biomaterials. 2003;24:1631-41.
7. Lazovic G, Colic M, Grubor M, Jovanovic M. The application of collagen sheet in open wound healing*. Ann Burns Fire Disasters 2005;18:151-6.
8. Singh O, Gupta SS, Soni M, Moses S, Shukla S, Mathur RK. Collagen dressing versus conventional dressings in burn and chronic wounds: A retrospective study. J Cutan Aesthet Surg 2011;4:12-6.
9. Gupta RL, Jain RK, Kumar M et al.: Fate of collagen sheet cover for artificially created raw areas. Ind J Plast Surg 1978;40(12):647-50.
10. Gerdling RL, Frantianne R: Biosynthetic skin substitute v/s 1% silver sulphadiazine for inpatient management of partial thickness burns. J Trauma 1988;28:1265.
11. Barret JP: Biobra nev/s1%SSD in second degree paediatric burns. Plast Reconstr Surg 1999; 105(1):62-5.
12. Frank DH: Comparison of biobrane, porcine and human allografts as biological dressings for burn wounds. J Burn Care Rehab 1983;4:186.
13. Yang JY: Clinical application of collagen sheet, YCWM as burn wound dressing. Burns 1990;16(6):457-61.
14. Gerding RL, Emerman CL, Efron D, Lukens T, Imbembo AL, Fratinanne RB. Outpatient management of partial thickness burns: biobrane versus 1% silver sulphadiazine. Annals of Emergency Medicine 1990;19:121.
15. Demling RH, Desanti L. Management of partial thickness facial burns(Comparison of topical antibiotics and bioengineered skin substitutes). J Burn Care and Rehabilitation 1999;25:256.