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A Comparative Study on Collagen Vs Silversulphadiazine Dressing in Burns Wounds

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Abstract:
Our aim of Study is to compare the effectiveness of collagen dressing in treating burns wound compared with that of conventional 1%Silver sulphadiazine dressing.
METHOD*: During the period of study 60 patients who presented with second degree partial thickness burns were chosen by random sampling technique and were grouped into two groups consisting of 30 patients each one group the test group was treated with Collagen dressings and the other Control group was treated with conventional Silver sulphadiazine dressings and the effect of each were compared.*
RESULTS*: We observed that duration taken for the wound healing is much lesser in Collagen group compared to Conventional dressing. .It was also observed that duration of hospital stay is less that is 9.8 Days in those treated with collagen dressing as compared to 16.66 Days in Conventional group. It was also observed that there was less pain and better patient compliance and effect of morbidity also less with Collagen dressings.*
CONCLUSION *:Collagen sheet is very useful in second degree partial thickness burns. It is very well tolerated, provides multiple benefits and overall cost benefit factor is very good when compared to Conventional dressings*
Keywords: *COLLAGEN, 1% SILVER SULPHADIAZINE OINTMENT.*

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I. Introduction

The WHO describes burns as destruction of some or all the layers of skin, when they come in contact with hot solids (contact), hot liquids (scalds), or a flame (flame burns), or due to lightning or radiation injury With the advancement in facilities, percentage of saving burns victim increases. Most of the patients are in the productive age group, Government of India has launched a National program for prevent and management of Burns injury It has also established Burns Registry to study the epidemiology. Surgeons have come a long way in treating burns injury from oil soaked clothes application to Skin grafting and recently recombinant skin tissue. The improved insight into the pathophysiology of burns and the recent advances in the management of burns lead to better life expectancy, but often some suffer with disfiguring scars and functional disorders. There came into play the role of collagen which is said to improve healing and decrease morbidity, which lead us to study the advantages of collagen dressings in burns patients..

II. Aims and Objectives

To compares the advantages and disadvantages of collagen use in burns treatment with that of conventional dressings

2.1 Aim

1. Relief of pain
2. Decreased tissue edema
3. Decreased weeping wounds
4. Prevention of burn extension
5. Faster healing

2.2 Objectives

1. Decreased use of analgesics
2. Decreased topical sepsis

3. Decreased tissue edema
4. Decreased burn extension
5. Decreased duration of stay in hospital
6. Increases healing rates
7. Increase the rate of revascularization
8. Decreased the effect of morbidity
9. Acceptable cost benefit factor

III. Materials and Methods

A prospective study was done at Coimbatore Medical College Hospital between July 2015 to June 2016 in which 60 patients who presented with partial thickness burns (< 40%TBSA) were chosen for the study by Random Sampling Technique. 60 patients were divided into 2 groups 30 in collagen group and 30patients in silversulphadiazine group

3.1 Inclusion criteria:

1. The patients above 18 years of age who are willing to participate in the study after giving written informed consent.
2. Patients with partial thickness burns
3. Patients who are salvageable (<40%TBSA). (TBSA- Total Body Surface Area)
4. Patients with burn wounds not older than 48hours.

3.2 Exclusion criteria

1. Pregnant women.
2. Persons not capable of giving consent(psychiatric patients).
3. Facial burns.
4. Persons unwilling to undergo the study (who refused to give consent)
5. Patient with full thickness burns.
6. Patient with electrical and other non-thermal burns.
7. Patient with burnt wounds older than 48 hours.
8. Patients allergic to collagen.

3.3 Materials used:

1. Collagen sheets (contains sterile reconstituted type-1 collagen sheet)
2. 1% silver sulphadiazine
3. Dressings with cotton pads and roller gauze.

Purified reconstituted collagen is used our study. This collagen is cross-linked with tanning agents like gluteraldehyde or chromium sulphate which increase its tensile strength and make it insoluble and decrease its rate of resorption and antigenicity. The collagen membranes of varying dimension 5 x 5cms, 10 x 10cms and 25 x 25 cms, and thickness of 0.6mm Sterilized by gamma irradiation was used.

3.4 Technique of application:

Group 2 (Conventional dressing):Thorough wash of the burn wound done using Normal saline. Silver sulphadiazine ointment was applied over the cleaned wound and occlusive dressing was applied with guaze-pad and roller bandage. The patients were asked to take bath with soap once in every 2 days and the dressings were changed along with the application of ointment.

Group 1(Collagen dressing): Thorough wash of the burn wound done using Normal saline. Then the collagen sheet soaked in normal saline is directly applied over the burn wound and gently spread over the wound. The collagen dressing allowed drying. The collagen gets adherent to the skin wound in few hours. The patient was asked not to move till the collagen dries off. The applied collagen was allowed to peel off by itself after the wound had fully epithelized and healed. Patients were followed up on days 1, 2, 7, 14, and 28 or for more days in event of any adverse effects related to medication or aggravation symptoms or complications, and they were discharged once complete epithelization occurred. Time taken for complete epithelization in both the group was noted and all were advised to review after a month in order to assess and manage any late complications like hypertrophied scar, contractures and keloids.

Data were collected in terms of age, Cause, Type, Degree and percentage, Grade, Treatment given, Time take for wound healing, Duration of hospitalization, Texture of healed area.

3.5 Statistical analysis The statistical analysis was done using Mann whitney test and chi square test,Fishers exact test and the analysis interpreted by the p value and Z value (p value of less than 0.05 was considered

statistically significant).

Table 1: Age distribution

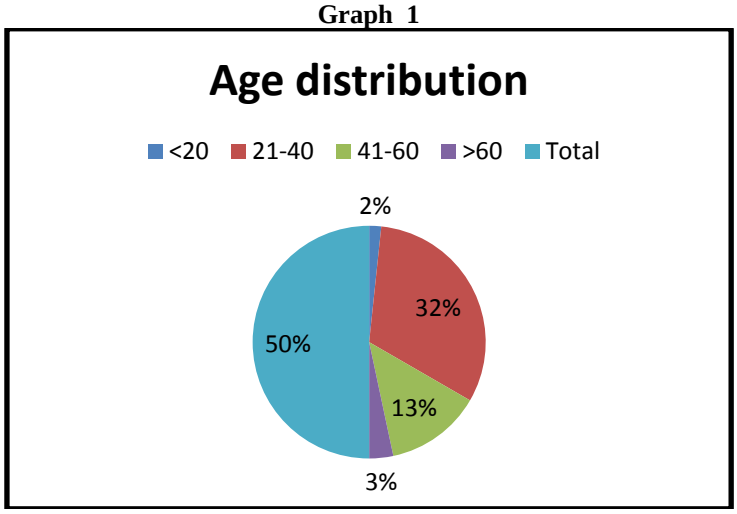
IV. Observation and Results

4.1 Demographic data :

Table 1: Age distribution

Age	Group		Total
	Group 1 n=30	Group 2 n=30	
<20	1	2	3
21-40	19	18	37
41-60	8	9	17
>60	2	1	3
Total	30	30	60

Graph 1



$\chi^2 = 0.75(<3.84)$

There is no significant difference between the age distributions of two groups and hence the data is comparable

Table 2 : Sex Variation Involved In Burns

		Group		Total
		Group 1 n =30	Group 2 n=30	
Sex	Male	15	13	28
	Female	15	17	32
Total		30	30	60

$\chi^2 = 0.26(<3.84)$

There is no significant difference between the sex

Cause	Group		Total
	Group 1 n=30	Group 2 n=30	
Accidental	30	30	60
Total	60	60	60

distributions of two groups and hence the data is comparable

.

Table 3: Cause of Burns

Infection	Group 1 n=30	Group2 n=30	Total
Present	10	18	28
Absent	20	12	32

All burns were due to accidental burns, hence the data is comparable between the two groups and all the patients included in group1 and group 2 had second degree burns

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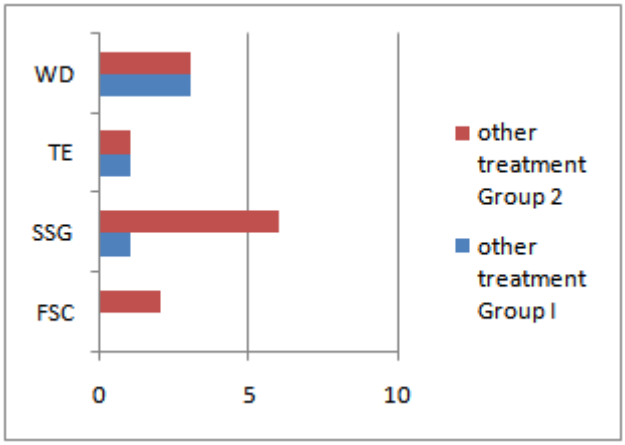
Table 4: Comparison of patients requiring Other modalities of Treatment

Other treatment	Group		Total
	Group I n=30	Group 2 n=30	
FSC	0	2	2
SSG	1	6	7
TE	1	1	2
WD	3	3	6

Graph 2



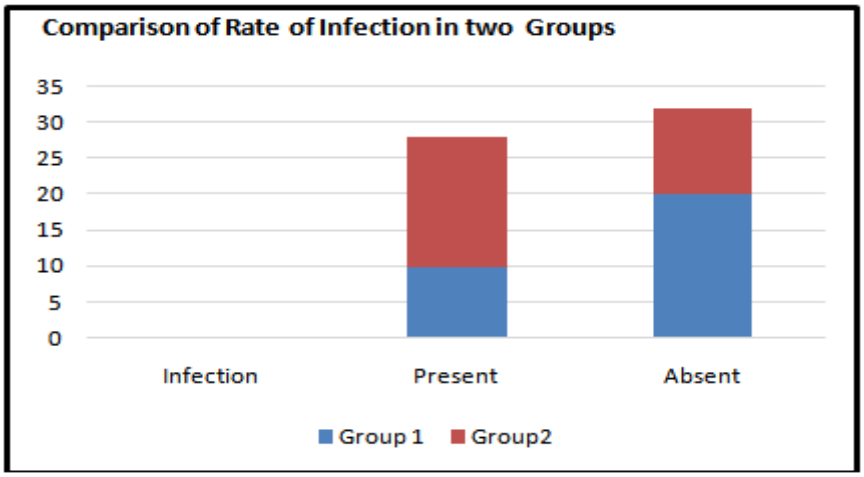
Chi square value = 4.02 p value <0.05

There is a statistically significant difference noted between two groups including the patients receiving collagen
group has less need for other modalities of treatment.

Table 5 Comparison of rate of infection between two groups

Infection	Group 1 n=30	Group2 n=30	Total
Present	10	18	28
Absent	20	12	32

Graph 3



CHI SQUARE VALUE =4.284 P VALUE <0.05

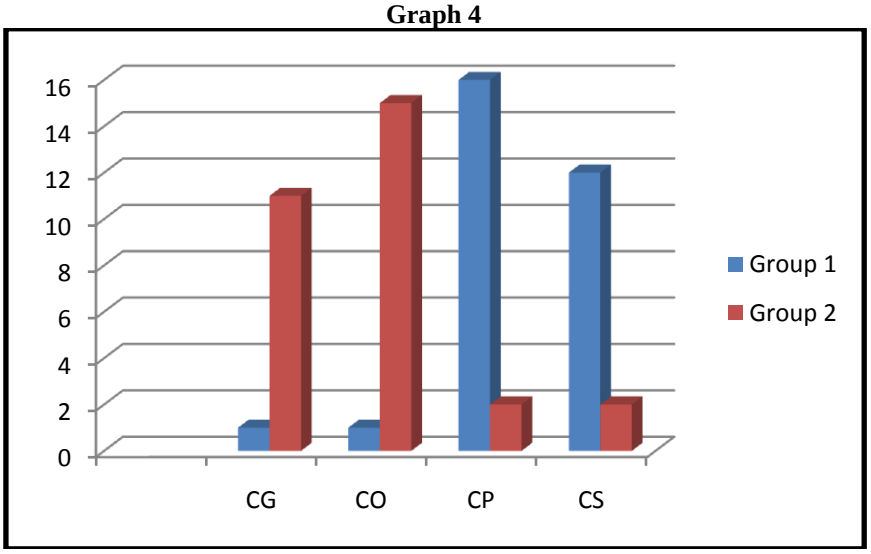
There is a statistically significant difference in comparison of rate of infection is less noted in those with collagen dressing.

Table 6: Comparison of Colour of scar between two groups

Colour	Group 1 n=30	Group 2 n=30	Total
CG	1	11	12
CO	1	15	16
CP	16	2	18
Total	30	30	60

p value = <0.001

Graph 4



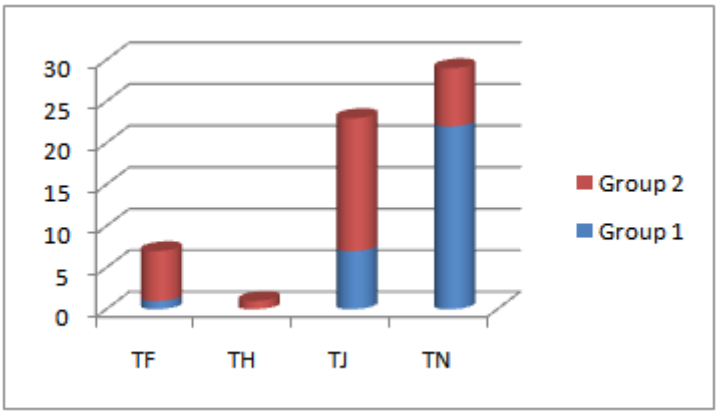
There was highly statistically significant difference in the colour of the scar between the two groups with a p= <0.001 chi square = 38.61

Table 7: Comparison of Texture of scar between two groups

Texture	Group		
	Group 1 n=30	Group 2 n=30	Total
TF	1	6	7
TH	0	1	1

TJ	7	16	23
TN	22	7	29
Total	30	30	60

Graph 5



It was observed that highly statistical significant difference in the texture of the scar between the two groups with a p= <0.002 chi square = 15.84

Table 8 : Comparison of Development of Contracture between two groups

CONTRACTURE	Group		
	Group 1 n=30	**Group 2 n=30**	**Total**
Present	1	12	13
Absent	29	18	47
Total	30	30	60

p= < 0.001

Results show a statistically significant reduction in contracture in collagen group. There was a statistically significant difference in colour, contour and texture of scar between the two groups, and hence concluded that Collagen group yields better results.

Table 9: Duration of hospital stay

Group	**Number**	**Minimum**	**Maximum**	**Mean**	**Mannwhitney test z value**	**P value**
Group 1	30	5	18	9.8	2.25	0.012
Group 2	30	8	25	16.6		

In duration of hospital stay scale analysis we concluded that Collagen group had statistically significant lesser hospital stay than that of Conventional group

Table 10: Duration of wound healing

Group	**Number**	**Minimum**	**Maximum**	**Mean**	**Mannwhitney test z vlue**	**p value**
Group 1	30	10	25	19.0		
Group 2	30	15	30	25.1	1.95	0.025

In the duration of wound healing scale analysis shows that the Collagen group had statistically significant reduction in duration when compared to conventional group**.**

Table 11: Percentage of burn scar assessment

Group	**Number**	**Minimum**	**Maximum**	**Mean**	**Mannwhitney test z value**	**p value**
Group 1	30	20	40	32.6	2.12	0.034
Group 2	30	20	38	35.1		

In the scar assessment scale analysis we concluded that Collagen group had statistically significant lower scars that of conventional group suggesting better scar in Collagen group

V. Discussion

Burn injuries produce coagulative necrosis of the skin and underlying tissues which is very painful and is associated with complex local and systemic pathology and a high mortality.

Superficial burns i.e. First degree burns heal in 5-7 days time without any scarring. While superficial dermal or deep dermal burns i.e. 2nd degree burns take anytime between 2 to 4 weeks to heal and are extremely painful. Second degrees burns if not treated promptly and properly, may get infected & get converted into third degree i.e. Deep burns resulting in scarring & contracture formation.

Inspite of rapid studies made in treatment of burns and better understanding of pathophysiology of burns and advent of good spectrum of antibiotics to prevent infection in burns, the 2nd to 3rd degree burns are still an enigma and challenge to the surgeons.

The morbidity and mortality in burns is still high. To decrease morbidity and mortality tangential / primary excision and grafting has become imperative in second and third degree burns. But the effort to prevent the progression of depth of burns, the relief of pain, the requirement of high quantities of intravenous fluid for resuscitationand use of multiple antibiotics is still a daunting tasks for the surgeons.

Analysis of collected data and interpretation data in comparison to other studies:

In their study, Lazovic and co-workers have[56] given the importantphysical properties of Collagen material which was given below as follows.

A.Biological

- Collagen material is non-inflammatory and non-toxic
- It has the tendency to facilitate the migration of Fibroblasts and Microvascular cells.
- It produces neodermal collagen matrices
- It has low antigenicity
- It has the property of minimal biodegradation
- Its produces minimal scar formation

B.Physiological properties

- Collagen sheet prevent the entry of micro organisms
- It modulates fluid flux from the wound
- It has elasticity , soft and supple property
- It has very good tear strength
- It has the capacity of easily peeled off from the wound

In our study we also found some characteristic common to these in agreement to the above study in terms of collagen sheet being non-toxic, non-alergic and helping in minimizing scarring.

A prospective comparative study by Mukund.et.al[50] comprising of 50 patents majority of them had less than 10% burns in both the groups in comparison to our study which had 21% TBSA as the mean when the percentage of burns was analysed.

Mukund and His co workers in their prospective comparative study of collagen dressings and silver sulphadiazine. Wound healing time required in control group was an average of 18.44 days and in test group was 12.64 days and concluded that the collagen sheet promotes early healing time,reduction of pain and the need of analgesics were decreased and associated complications as compared to conventional topical dressing.The effect of morbidity was reduced in patients receiving Collagen dressings.Which is comparable to our study in which the collagen group wound healing time is lesser.

Marilyn and his collegues[57] studied 43 patients aged 1 to 57 years of both sex with deep second degree burn injury ranging 8% to 40% of the body surface area, randomized to receive the type -1 collagen dressing or 1% silver sulphadiazine.In this study 23 patients were randomly selected for collagen dressings and 22 patients forsilver sulphadiazine dressings and 2 patients in silver sulphadiazine group lost follow up, so that a total of 43 patients were evaluated.

It was observed that collagen dressing caused significant amount of rapid re-epithelisation of burns woundi.e less duration of wound healing than silver sulphadiazine group. In that Statistical analysis concluded that median time taken for wound healing was 7.2 days in collagen group over14.5 days in the silver sulphadiazine group.This observation also concludes shorter time taken for wound healing caused by collagen dressing is clinically relevant and further demonstrates the wound healing activity of type -1 collagen. In our study time taken for wound healing is much lesser in the collagen group and is comparable to the above study.

VI. Conclusion

Collagen sheet is safe and effective for treating Burn patients over Silver sulphadiazine dressings.

- Collagen sheet has been very well tolerated in burn patients.
- Collagen dressing improves the healing process of Burn wound when compared to conventional dressings.
- It has minimised the duration of follow up period and the usage of antibiotics.
- The overall cost benefit factor is comparable between the two groups

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Conclusion

A conclusion section must be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extentions. .

Acknowledgements

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