ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 8, Issue – 2, April – 2023 , Page No. : 224 – 238

Comparison of Wound Healing & Outcomes of Conventional Silver Sulfadiazine and Collagen Dressing in Pediatric Partial Thickness Burns in Tertiary Care Centre in South India.

[1] Gayathri S, Intern, MBBS, Govt. Kilpauk Medical College, Chennai, Tamilnadu, India.

[2]Dr. Angeline Selvaraj, Professor, Plastic Surgery, Govt. Kilpauk Medical College Hospital, Chennai, Tamilnadu, India.

Corresponding Author: Gayathri S, Intern, MBBS, Govt. Kilpauk Medical College, Chennai, Tamilnadu, India.

Citation this Article: Gayathri S, Dr. Angeline Selvaraj, "Comparison of Wound Healing & Outcomes of Conventional Silver Sulfadiazine and Collagen Dressing in Pediatric Partial Thickness Burns in Tertiary Care Centre in South India", IJMSIR- April - 2023, Vol – 8, Issue - 2, P. No. 224 – 238.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Burns are common household injuries in a developing country like India. Quarter of the total burn accidents in India among children lead to death. These severe burn injuries generally results in long hospital stay and worse out comes functionally and psychosocially. To improve the outcome specialized dressings can be used. Conven tional wound dressing material include silver sulfadia zine, nadi floxacin, povidone iodine and absorbent layers of pad and bandages, application of an antiseptic ointment.

Collagen sheets are bio logical dressing Manu factured from bovine tissues like intestine. These are applied directly over the wound after rinsing in saline. In this study we have compared the results of collagen dressings against conventional dressing with Silver Sulfadiazine in partial thickness burns for pediatric patients based on the factors – healing time, scar formation, pain, cost efficacy and interview of the patients.

The purpose of this study is to find a better dressing among collagen and conventional in pediatric partial thick ness burns. The study was conducted with 30 patients assigned to collagen group and 30 to conventi onal dressing group.

Five main factors – Healing Time, Scar, Pain, Cost and Quality of Life were taken to evaluate the collagen dressing over conventional dressing. Collagen shows statistically significant better result in terms of reepithi lisation time, pain score, scar score and quality of life.

It provides an ideal dressing for partial thickness burns. It forms an optimum environment and a mechanical barrier to prevent infection and provides faster healing rate. The scar formation is healthy due to its properties of inducing granulation and epithelialisation. The need for skin grafting is avoided in case of collagen application.

The collagen dressing is more cost effective than con ventional dressings though it is not statistically significant.

The con ventional dressings has disadvantage of the large number of dressings, prolonged hospital stay, amount of pain, loss of time and labor of the patient which makes collagen dressing more cost effective as it is most of the time a single dressing.

Continuous follow up was done for the patients during the study period which helped in obtaining more accurate

result. The Vancouver Scar Score was not accessed for the entire study population as the scar was not fully formed in the given study period of two months. The Scar Score study for collagen and conventional dressing can be further studied in depth once scar is completely formed.

At the end of analysis, it was found that collagen had significant advantage over conventional dressing in all the factors considered.

Keywords: Collagen, Epithelisation, Pain Scale, Partial thick ness burn, silver sulfa diazine, Vancouver Scar Score.

Introduction

Burns are common household injuries in a developing country like India. Quarter of the total burn accidents in India among children lead to death [1]. Of the total burn cases in India, 17 to 25 % are pediatric burns [2]. Burn injuries are the third most common cause of injury related death in children up to 9 years [3]. Scalds lead to most of the burns in children younger than 3 years [4].

Treatment of burn injury can have multifaceted effects on the child and their family due to painful wound procedure and possible surgical intervention.

The current focus of research into pediatric burn lies predominantly with severe burn injuries which generally results in long hospital stay and worse outcomes functionally and psycho socially.

However in high income countries, the majority of children sustain small partial thickness burn which is treated in IP settings with specialized dressings. To improve the outcome there are many specialized dressings in the armamentarium which can be used. [5]

The ideal burn dressing should be economical, easy to apply and readily available. Dressings or method of coverage should provide good pain relief, protect the wound from infection, promote healing, prevent heat and fluid loss, be elastic and non-antigenic and adhere well to the wound and allow spontaneous epithelisation of wounds.

Conventional wound dressing materials include silver sulfadiazine, nadi floxacin, povidone iodine and absorbent layers of pad and bandages, application of an antiseptic ointm ent.

Collagen sheets are biological dressing manufactured from bovine tissues like intestine. It is available in different sizes. These are applied directly over the wound after rinsing in saline. These are impermeable to bacteria, non-immunogenic, non-pyrogenic [6].

Being natural, it is easy to apply. These are hypo-allergic and give pain relief after application. Collagen creates a barrier between the wound surface and the environ ment [7].

Collagen initiates fibroblast forma tion and accelerates endothelial migration from bed upon contact with wound tissue. These dressings act as a scaffolding for new cells to grow and can be highly effective when it comes to healing. [8, 9]

Collagen dressings encourage healing process in many ways. Removal of dead tissue, aiding the growth of new blood vessels, and helping to bring the wound edges together, effectively speeds up healing. [10]

In this study we have compared the results of collagen dressings against conventional dressing with Silver Sulfa diazine in partial thickness burns for pediatric patients based on the factors – healing time, scar formation, pain, cost efficacy and interview of the patients.

Review of literature

Children have nearly three times the BSA to BM ratio of adults. Therefore, fluid losses are higher in children compared to adults. This leads to hypothermia which worsens the burn wound healing.

The most common com plication of burns includes toxic shock syndrome (TSS) which is caused by infection of bacteria which secretes toxins [11]. The features of TSS are pyrexia, rash, shock, leucopenia.[12]

Hence pediatric burns need more attention than that of adults; and therefore, children aged between 0 to 18 years are considered for this study.

Burns are defined as damage caused to one or multiple layers of skin and flesh by external sources such as heat or chemicals. The level of severity or depth of burn is denoted by the degree of burn while, the extent of injury is described using the percentage of the total body surface area (%TBSA).

The measurement of burn surface area is important during the initial management of people with burns for estimating fluid requirements and determi ning need for transfer the patient to a special care facility. [13] The Lund Browder charts are more accurate for children than either the Rule of Nines or palm size in identifying TBSA [14].

There are three types of burns. First degree or superficial burns include damage to the outermost layer of skin or epidermis only and do not extend into the dermis. This depth of burn results in redness (erythema) of the affected area, but no blistering (e.g., sunburn). First-degree burns usually heal within 7 to 10 days without scarring.

Second degree burns causes the skin to blister and the damage extends from epidermis to the dermis. While in third degree burns, the damage extends from epidermis to dermis and even the tissues underneath. [15]

There are four phases in healing namely: Hemostasis, Defensive/inflammatory, proliferation and maturation.

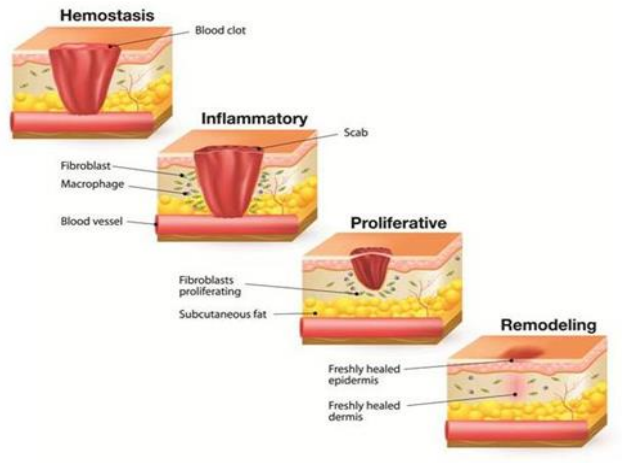


Figure 1: Stages of wound Healing

In the first phase of healing, the body activates its emergency repair system - the ubiquitous blood clotting system. During this process, platelets come into contact with collagen, resulting in its activation and aggregation. Thrombin initiates the formation of a fibrin mesh, which provide supports and strengthens the platelet clumps into a stable clot by acting as a nidus for accumulation of platelets. [16]

During Phase 2, neutrophils enter the wound to destroy invading microbes. These cells often reach their peak population between 24 and 48 hours after injury, reduc ing greatly in number after three days. [16]

As the neutrophils leave the site of injury, macrophages arrive to continue clearing debris. These cells also attract immune system cells to the wound to facilitate tissue repair by secreting a number of growth factors. This phase often lasts four to six days and is often associated with edema, erythema (reddening of the skin), heat and pain

Sub sequently the wound enters Phase 3, the Proliferative Phase, where the main aim is to fill and cover the wound. The Proliferative phase features three distinct stages: 1) filling the wound; 2) contraction of the wound margins; and 3) covering the wound (epithelialization). [16]

Finally in the maturation phase, the tissue remodels and matures and there is an overall increase in tensile strength.

The Maturation phase varies greatly from wound to wound, often lasting anywhere from 21 days to two years.

The first stage is characterized by shiny, deep red granulation tissue which fills the wound bed with connective tissue, and new blood vessels formation. In the contraction phase, the wound margins contract and pull toward the center of the wound, eventually leading to its obliteration. In the third stage, epithelial cells arising from the wound bed begin to migrate across the wound bed in leapfrog fashion completely it with epithelium. The Proliferative phase often lasts anywhere from four to 24 days. The Maturation phase is characterised by strengthening of new tissue and gaining flexibility. [17]

The healing process is remarkable and complex, and it is also susceptible to interruption due to local and systemic factors, including moisture, infection, and maceration (local); and age, nutritional status, body type (systemic). In order to establish right healing environment and faster healing time; proper dressing should be done which is analysed in the current study.

Burn injury to the skin invariably causes epithelial damage. The damage initiates a healing process which involves collagen, which leads to formation of discolored areas called scars. Second- and third-degree burns cause scars which are of three types. Hypertrophic scars are often red or purple, and raised. They may feel warm to the touch and itchy. Contracture scars tighten the skin, muscles, and tendons, and restrict mobility of the patient. Keloid scars form shiny, hairless bumps. [18]

The different Scar assessment methods are Vancouver Scar Scale, Visual Analog Scale, Patient and Observer Scar Assessment Scar and Manchester Scar Scale. The most recognised burn scar assessment method is Vancouver Scar Scale which is used in this paper. It assesses 4 variables: Vascularity, Height, Pliability and Pigmentation. [19]

Vascularity	Normal	0
	Pink	1
	Red	2
	Purple	3
Pigmentation	Normal	0
	Hypopigmentation	1
	Hyperpigmentation	2
Pliability	Normal	0
	Supple	1
	Yielding	2
	Firm	3
	Ropes	4
	Contracture	5
Height	Flat	0
	<2 mm	1
	2-5 mm	2
	>5 mm	3
	Total score	**13**

Table 1: Vancouver Scar Score

While second degree burns can heal spontaneously with minimal scarring, third degree burns require more than three weeks to close and are often associated with significant scarring and functional limitations unless excised and grafted within the first few days of injury.

Usually patients with large area of partial thickness burns suffer more pain than with equivalent amount of partial thickness burns. The functional independence level of the patient is drastically affected by the pain [20]. To ensure that patients relieve from the burn pain, standard pain scale measurement is necessary. There are different types of pain scale like Visual Analog Scale (VAS), Numerical Pain Scale (NMS) and Face Pain Scale (FPS).

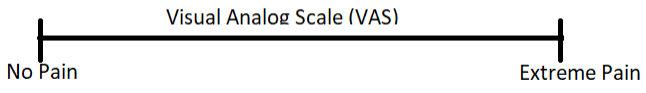


Figure 2: Visual Analog Scale

The pain intensity is measured by asking the patient to make a mark along the line for Visual Analog Scale. While in Numerical Pain Scale, the patient is allowed to rate pain intensity on a numbered scale from zero to ten. Face Pain Scale is used primarily for young children. Hence Pain assessment is chosen as a standard measurement for this study.

Figure 3: Face Pain Scale

Severe Burns are not only physical but also psycho logical consequences both during and after hospitali zation [21]. Burn Specific quality-of-life instruments are published in the paper "Reliability and Validity of the Dutch Version of the American Burn Association/ Shriners Hospital for Children Burn Out comes Questionnaire". It aims at monitoring the functional conse quences of burns between the ages of 5 and 18 years. In this paper BOQ Scale Score is calculated similar to that of Dal troy et al. [23].

For second degree burns and beyond, medical treatment should always be sought for the best chances of the wound healing properly. There are various burn wound dressings available and they are classified depending on the type of material used - Conventional, Synthetic and Biological dressing.

A conventional dressing material usually consists of gauze. Synthetic dressing includes films foam and sprays [24]. Films are homogenous dressing with polymer sheet coated on one side. They are only suitable for first degree wounds. Foams are sheets of foamed solution of poly mers such as polyurethane help in thermal insulation and providing a moist environ ment. Composite dressings consist of 2 or more layers. The outer layer provides durability and elasticity. Composite dressings include hydrocolloid dressings, bio brane, hydrogel sheets, granuflex etc. [25]. Biological dressings are obtained from natural tissues like collagen, elastin and lipid [26]. They are much better than the synthetic dressings. It includes allograft and xenograft and collagen dressing.

One of the most commonly used anti-bacterial agents for healing second degree burns is silver sulphadiazine. Silver sulfadiazine works by stopping the growth of bacteria that may infect an open wound. This helps to decrease the risk of the bacteria spreading to surrounding skin, or to the blood where it can cause a serious blood infection (sepsis). But recent reports suggest that it causes slower dermal regeneration because of cytotoxic effect of SS on dermal cells. It also has other side effects such as pain, burning or itching of the treated skin, upset stomach, discoloration of skin and mucous membranes [6]. Therefore, many alternate treatment studies came up, of which one of them is collagen wound dressing.

Collagen dressing is impermeable to bacteria and creates the most physiological surface between the wound and the surrounding environment. It is an important morpho genetic factor in embryonic development and regene rative process. Collagen helps in each stage of healing process

- Collagen acts as a stimulator to release adenosine diphosphate that helps in aggregation of platelets.
- The carbohydrate moiety of collage plays a major role in platelet adhesion.
- In addition, migration of fibroblasts (principal collagen producing cells) helps in reparative connective tissue.
- The final stage of healing is scar formation that bridges the gap between edges of the injured tissue formed from maturation and degradation of collagen.

- Also, the hydrophilic nature of collagen attributed by its molecular structure provide a favorable environment for cell adhesion [27,28]

Gupta RL in his paper, 'Role of Collagen Sheet cover in burns' has concluded that collagen provides epithelia lisation in addition to safeguarding again exogenous infection. Collagen sheet cover was used in 32 cases of fresh burns and 26 cases of post burn contract ures and in majority of cases, it remained dry and there was no infection [29]. Also, professor Srinivasa in his paper, 'A Clinical Study of Collagen Dressing Over Silver Sulpha diazine Dressing in Partial Thickness Burns' has inferred that collagen is an ideal dressing based on pain score, healing time and cost efficacy. Pain was signifi cantly reduced in patients dressed with collagen since it forms a temporary barrier preventing any external source from stimulating nerve endings to cause pain. Collagen dressings helped to form a mechanical barrier between wound and environment thus preventing infections. The rate of wound healing was significantly faster in collagen dressing than SSD. The morbidity of patients too is less as the scar formation is healthy in most of the patients using collagen owing to its pro perties of inducing granu lation and epithelialisation. [6]

The paper 'A Comparative Study of Collagen Sheet Cover Versus 1% Silver Sulphadiazine in Partial Thick ness Burns' has analysis on collagen sheet that it is a better mode of treatment for superficial wounds provided it is applied early before contamination. It is beneficial to the patient in terms of comfort from pain, early healing and decreased hospital stay. The study comprised of 50 patients divided into two groups, test group treated by collagen dressing and control group treated by 1% silver sulphadiazine. The average pain levels were 2.64 in control group and 1.2 in test group. The average healing time also reduced to 12.64 days while in control group it was 18.44 days. Collagen dressing has also decreased the need for analgesics. [30]

In the paper, 'A Comparative Second-Degree Burn Treatment Trial Collagen Dressing vs. Silver Sulpha diazine', type-I collagen dressing was used for the com parative study. Type - I collagen has important mecha nical and structural functions and also plays a key role in wound-healing processes. Besides helping the de bride ment, the type - I collagen may be triggering normal in flammatory response to activate neo Angio genesis in injured tissues. The reason for the favorable results of collagen dressing in terms of preventing the bacterial infection is speculated to come through its initial binding of the topically applied bacteriostatic/ anti biotic agents initially used over the burn wound. The analysis showed that median time to heal was 7.2 days in collagen group vs 14.5 days in silver sulphadiazine group. [31]

From the above three studies for collagen dressing, it is evident that collagen helps in burn wound treatment. Therefore, in the present study, comparison of collagen and silver sulphadiazine dressing is done taking not only healing time, scar formation and pain relief into consideration but also cost efficacy, quality of life.

Aims and objectives

To compare the wound healing and outcomes of conventional silver Sulfadiazine dressing and collagen dressing for partial thickness burns in pediatric age group.

Objectives

- To determine the most effective method of dressing for reduced wound reepithelization time and pain during dressing changes and assess the immediate scar outcome of study participants and complete a cost-effective analy sis of wound dressing.
- To explore the experience of parents in the inpatient setting and patient's quality of life.

Materials and methods

Study Design	:	Randomized Controlled Trial
Study Centre	:	Department of Burns & PS in our college hospital
Study Period	:	Two months (August 15th – October 15th)
Sample Size	:	30 in each group
Study Population	:	Pediatric partial thickness burns with less than 40%, within 72 hours post injury and non-Electric burns.

Cases

Inclusion criteria

Male/ Female aged below 18 years.

- With total body surface area < 40 % partial thickness burn injuries
- Within 72 hours post injury are recruited for a Rando mized Controlled Trial

Exclusion Criteria

- Patient above 18 years
- Patients more than 72 hours post injury.
- Patients with electrical burns are excluded.

Procedure

Patients were randomized into one of these 2 groups.

- Conventional dressing
- Collagen dressing

Dressing is changed every 3-5 days until full reepitheli sation occurred / skin grafting was done. Also a qualitative study was done by conducting inter views with ten parents of study participants for evalua ting their quality of life.

Investigation

The number of days taken for full reepithelization must be noted in the 2 groups.

- Pain scores is compared in the 2 groups. Pain will be assessed by using a feasible pain scale for children which is Face pain scale.
- Time for strike through and need for dressing is compared in both groups.
- Any systemic symptoms like fever are noted in both groups.
- Once in 3 days total count of WBC is taken. This is done to diagnose infections.
- At each dressing changing a wound is clinically assessed and if consultant deems an infection a swab is taken for confirmation and identification.
- Scar quality – Vascularity, pigmentation pliability and height at the time of wound healing are assessed using Vancouver scar scale. The total scar is compared in the 2 groups.
- Cost Analysis: Cost directly related to the manage ment of partial thickness burn injuries < 40 % TBSA was calculated for both the groups and compared.

Data collection procedure and instrument used

Data collection is done using standardized proforma by the principal investigator. All the biochemical analysis is done by using automated and semi-automated chemical analyser.

Quality control

All blood investigation is done with adequate internal and external quality checks and within run and between run CV'S is maintained.

Confidentiality

Informed consent was obtained from all the patients. Confidentiality and safety of the patients is taken care of.

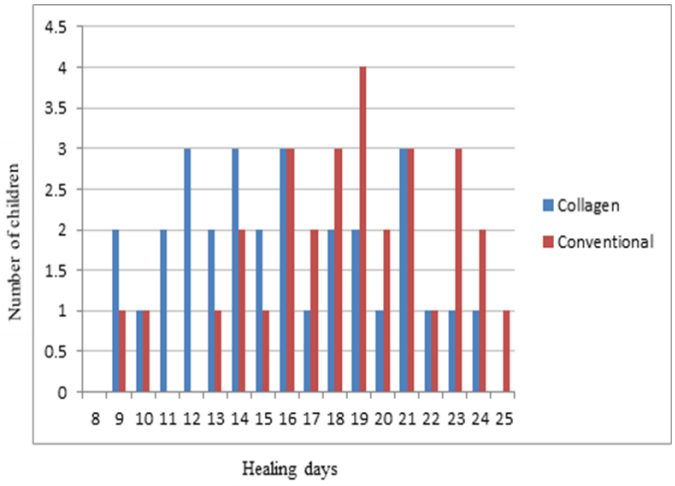
Observations and results

Time taken for complete wound healing.

Healing time		
Healing days	Collagen	Conventional

8		
9	2	1
10	1	1
11	2	
12	3	
13	2	1
14	3	2
15	2	1
16	3	3
17	1	2
18	2	3
19	2	4
20	1	2
21	3	3
22	1	1
23	1	3
24	1	2
25		1
Total	30	30

Table 2: Comparison of healing time for collagen and conventional dressing



Graph 1: Comparison of healing time for Collagen and Conventional Dressing

Independent T test between wound healing time and type of dressing:

Type	N	Mean	SD	T value	df	P value
Collagen	30	15.83	4.276	2.587	58	<0.001
Conventional	30	18.60	4.005			

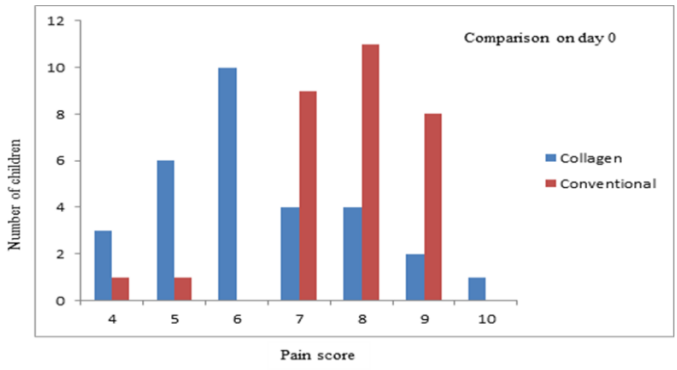
Table 3: Statistical Comparison of healing time for collagen and conventional

Wound healing time showed a significant difference with a p value < 0.001, indicating faster healing in collagen dressing. Pain assessment was done using faces pain scale on day 0, day 3 and day 5.

Pain assessment on day 0:

Pain score on day 0		
Pain score	Collagen	Conventional
4	3	1
5	6	1
6	10	
7	4	9
8	4	11
9	2	8
10	1	
Total	30	30

Table 4: Comparison of pain score on day 0



Graph 2: Comparison of pain score on day 0

After application of collage on day 0, 30% of patients had pain score less than 6, whereas with conventional dressings, 7% patients had pain less than 6.

Independent T test between Type of dressing and VAS scale on day 0:

Type	N	Mean	SD	T value	Df	P value
Collagen	30	6.33	1.539	3.964	58	<0.01
Conventional	30	7.73	1.172			

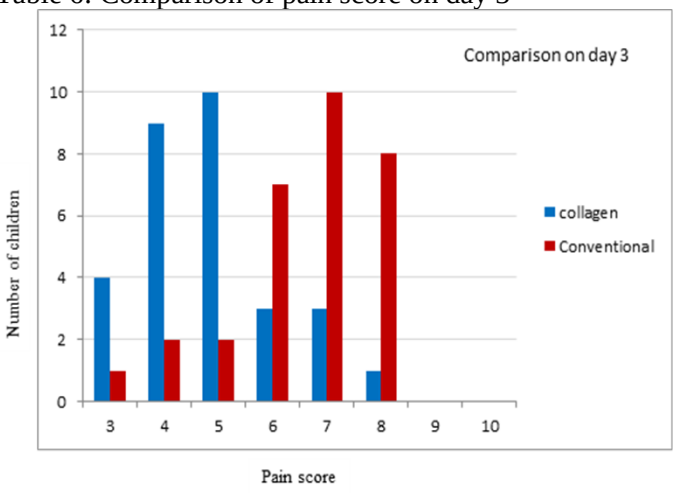
Table 5: Statistical Comparison of pain score on day 0

Comparison of pain in both the groups on day 0 showed a significant difference with p value < 0.001, inferring that pain in collagen dressing is significantly less compared to conventional dressing.

Pain assessment on day 3:

Pain score on day 3		
Pain score	Collagen	Conventional
3	4	1
4	9	2
5	10	2
6	3	7
7	3	10
8	1	8
9		
10		
Total	30	30

Table 6: Comparison of pain score on day 3



Graph 3: Comparison of pain score on day 3

On day 3, in collagen dressing group, 77% of patients had pain score less than 5 whereas with conventional dressings, 17% of patients had pain score less than 5.

Independent T test between Type of dressing and VAS scale on day 3:

Type	N	Mean	SD	T value	Df	P value
Collagen	30	4.80	1.400	5.010	58	<0.001
Conventional	30	6.57	1.331			

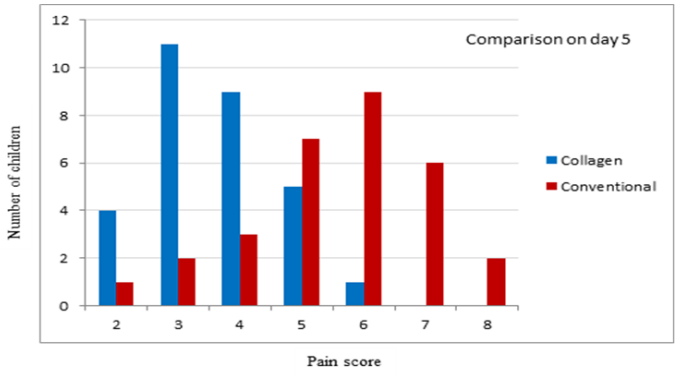
Table 7: Statistical Comparison of pain score on day 3

Comparison of pain in both the groups on day 3 showed a significant difference with p value < 0.001, inferring that pain in collagen dressing is significantly less compared to conventional dressing.

Pain assessment on day 5:

Pain score on day 5		
Pain score	Collagen	Conventional
2	4	1
3	11	2
4	9	3
5	5	7
6	1	9
7		6
8		2
Total	30	30

Table 8: Comparison of pain score on day 5



Graph 4: Comparison of pain score on day 5.

On day 5, in collagen dressing group, 97% of patients had pain score less than 5 whereas with conventional dressings, 43% of patients had pain score less than 5.

Type	N	Mean	SD	T value	df	P value
Collagen	30	3.60	1.037	6.029	58	<0.001
Conventional	30	5.57	1.455			

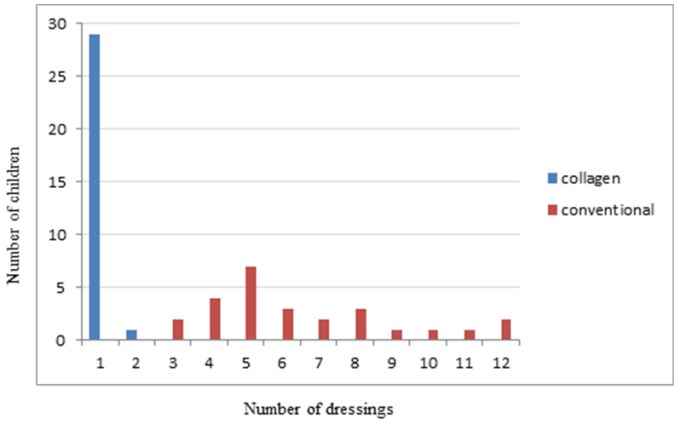
Table 9: Statistical Comparison of pain score on day 5

Comparison of pain in both the groups on day 5 showed a significant difference with p value < 0.001, inferring that pain in collagen dressing is significantly less compared to conventional dressing.

Number of dressings

No of dressings	Collagen	Conventional
1	29	
2	1	
3		3
4		6
5		4
6		7
7		2
8		6
9		2
Total	30	30

Table 10: Comparison of Number of dressing changes



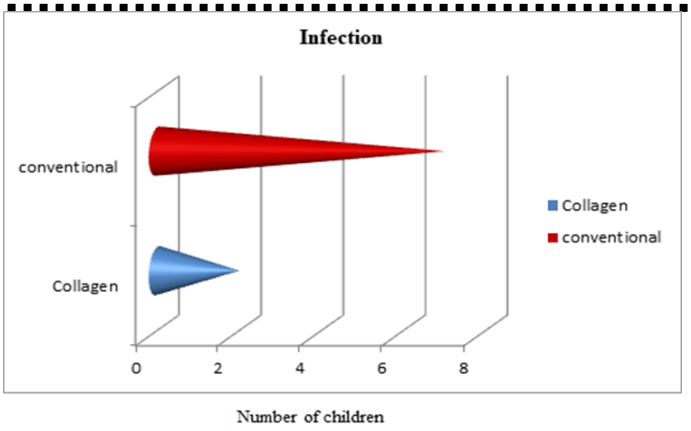
Graph 5: Comparison of Number of dressing changes

All patients in collagen group require only one dressing, except one patient who has been infected.

Infections

	Collagen	Conventional
Infection	2	7

Table 11: Comparison of Number of children infected

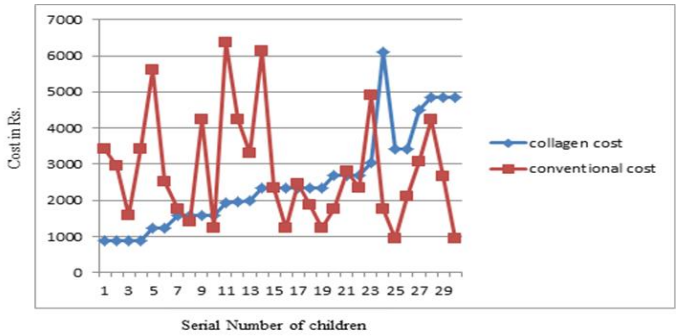


Graph 6: Comparison of Number of children infected

WBC value is taken three days once to find out if wound is infected. Ninety percent of collagen dressing patients had no infection. Infection rate is much less with collagen dressing.

Cost efficacy

A cost comparison was made for the two groups.



Graph 7: Comparison of Cost efficacy

Type	No of dressing changes	Total cost	T vale	df	P value
Collagen	31	75360	0.843	58	> 0.05
Conventional	192	84750			

Table 12: Statistical Comparison of Cost efficacy

The cost of collagen dressing is found lesser than con ventional dressing. In case of conventional number of dressing changes is multiple where as in collagen group it is only single dressing. Since our T value is less than the critical value and P value is greater than 0.05, the cost difference is statistically not significant. Due to long healing time. other indirect costs are involved in the

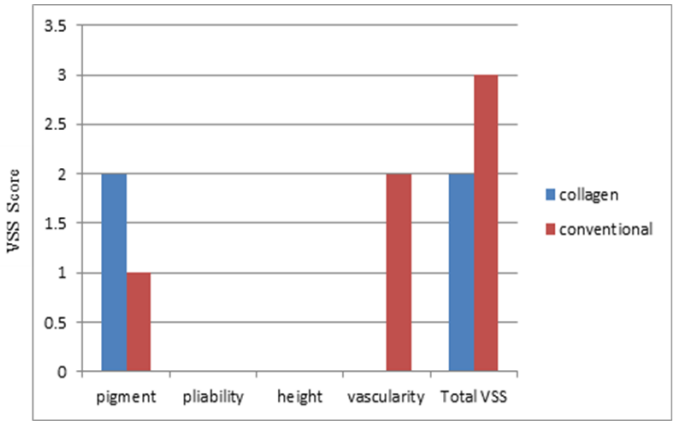
conventional dressing like cost due to long hospital stay, cost due to additional medicines to reduce pain and infection, cost of labor of the accompanying person, cost of transportation charges for moving to hospital and back for the family members. Considering all these costs associated with conventional dressing, collagen dressing is significantly more cost effective than conventional dressing.

Scar analysis

The scars of ten patients were analysed for pigmentation, pliability, vascularity and height. The total vancour scar score was less for collagen group.

Type	No of dressing changes	Total cost	T vale	df	P value
Collagen	31	75360	0.843	58	> 0.05
Conventional	192	84750			

Table 13: Comparison of Scar



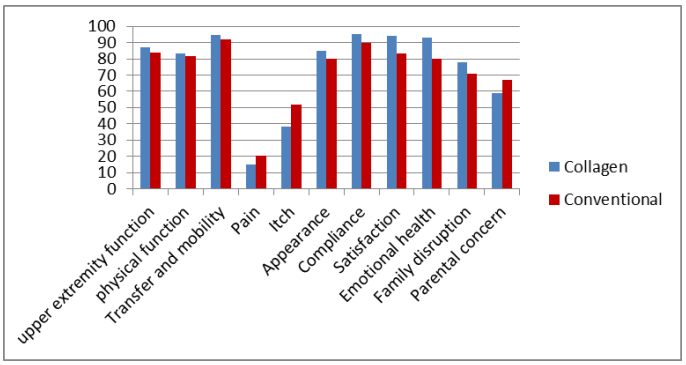
Graph 8: Comparison of Vancouver scar score

Interview Score Analysis

The interview was taken for 10 patients, five from each group at the time of discharge. The collagen mean score is good when compared with the conventional mean score for the factors considered in the table 13. The patient score value range from 0 to 100, highest score being 100.

Sn.	Description	Collagen Mean score	Conventional Mean score
1	upper extremity function	87	84
2	physical function	83.2	81.6
3	Transfer and mobility	94.8	92.2
4	Pain	14.7	20.2
5	Itch	38	52
6	Appearance	85	80
7	Compliance	95	90
8	Satisfaction	94	83
9	Emotional health	93	80
10	Family disruption	78	71
11	Parental concern	59	67

Table 14: Comparison of BOQ (Burn Outcome Questionnaire) Score for collagen and conventional dressing



Graph 9: Comparison of BOQ Score for collagen and conventional dressing.

Results & discussion

The main objective in the current report is to find better dressing among collagen and conventional silver sulfadiazene for pediatric partial thickness burn patients. Hence randomized control trial which includes thirty cases in collagen and conventional each was taken for analysis in the Department of Burns and Plastic Surgery in our institution.

The exclusion criteria include patients above 18 years, patients more than 72 hours post injury and patients with electric burns.

The first object factor in this paper, healing time is defined as the time taken for more than 90% epithelialization of the wound. In the study conducted by Gupta, healing time shows a range of 10 to 14 days for collagen. Barret et al. recorded a healing time of 9.5 days in collagen group and 16.5 days in conventional group. In the current study the collagen group had an average healing time of 15.8 days whereas or the conventional group it is 18.6 with a significant p value less than 0. 001.It implies less healing time in collagen as compared to conventional dressing.

Pancy Sonia Moses et al in her paper got a mean VSS score of 5.73 in collagen group and 6.77 for conventional at the end of 21 days. For scar assessment here, five patients from each group were considered as the scar is not yet formed for others at the end of nearly one month follow up. The mean Vancouver score of the five patients for collagen is 2 and for that of conventional is 3; that implies collagen is better than conventional dressing. But it is early to conclude as the proper scar formation takes at least six months. The study will be continued to obtain a deterministic decision with respect to scar score.

Gerding et al conducted the similar study in adults and recorded an average pain score of 1.6 in collagen group and 3.6 for conventional group. Demling observed a pain score of 2 in collagen group and 4 in conventional group in adults. In this study, pain scores were recorded on day 0, day 3 and day 5 using a 0 to 10 face pain scale. For day 0, the mean pain score for collagen is 6.33, and for that of conventional are 7.73. For day 3, the mean pain score for collagen is 4.80, and for that of conventional are 6.57. For day 5, the mean pain score for collagen is 3.60, and for that of conventional are 5.57. The p value being less than 0.001 implies statistically significant reduction of pain in collagen group as compared to conventional group.

In the study conducted by Arvind Naik et.al, he considered a patient having 30% partial thickness. The cost of collagen is Rs. 3770 and for conventional it is Rs 4410. In the present study, the mean cost of collagen dressing is Rs 2512 and for conventional, the mean cost is Rs 2825. Multiple dressings are required in case of conventional whereas in collagen only one time it is applied. The cost of collagen dressing is less compared to conventional dressing. But it is not statistically significant. In conventional group the additional cost factors involved are cost due to long hospital stays, more pain and associated medications, loss of labor of accompanying person, and excess transportation cost of family members. Considering the above all cost factors, the collagen dressing is more cost effective than conventional dressing.

Interview is the final objective in this study, and score is evaluated by taking the work of Lawren H Daltroy et al as base and modified the questions appropriately to be asked at the time of discharge. In this paper, interview was taken for five patients from each group as already mentioned in the proposal submitted. The factors considered for collagen and conventional mean score to determine burn specific quality of life are upper extremity, physical function, transfer and mobility, pain, itch, appearance, compliance, satisfaction, emotional health, family disruption and parental concern (questions are given in proforma). The lowest score is 0 and highest score is 100. From the analysis, it is clear that collagen mean score is better than conventional mean score from all perspectives chosen.

Conclusion

Collagen shows statistically significant better result in terms of reepithilisation time, pain score, scar score and quality of life.

It provides an ideal dressing for partial thickness burns. It forms an optimum environment and a mechanical barrier to prevent infection and provides faster healing rate. The scar formation is healthy due to its properties of inducing granulation and epithelialisation. The need for skin grafting is avoided in case of collagen application.

The collagen dressing is more cost effective than conventional dressings though it is not statistically significant. The conventional dressings has disadvantage of the large number of dressings, prolonged hospital stay, amount of pain, loss of time and labor of the patient which makes collagen dressing more cost effective as it is most of the time a single dressing.

Continuous follow up was done for the patients during the study period which helped in obtaining more accurate result. The Vancouver Scar Score was not accessed for the entire study population as the scar was not fully formed in the given study period of two months. The Scar Score study for collagen and conventional dressing can be further studied in depth once scar is completely formed.

References

1. Ahuja RB, Bhattacharya s. An analysis of 11196 burn admissions and evaluation b of conservative manage ment technique. Burns. 2002; 28: 55 5-61. [Pub Med] [Google e scholar]

2. Gupta M, Gupta OK, Yaduvanshi RK, Upadhyaya J. Burn epidemiology; The pink city scene. Burns 1993; 19: 4 7-51. [PubMed] [Google scholar]

3. Reed JL, Pomerantz WJ. Emergency management of pediatric burns. Pediatr Emerg Care. 2005; 21:118–29. [Pub Med] [Google Scholar]

4. Lowell G, Quinlan K, Gottlieb LJ. Preventing unin tentional scald burns: Moving beyond tap water. Pediatrics. 2008; 122: 799 – 804. [Pub Med] [Google Scho lar]

5. Gee Kee, E., Kimbke, R.M., Cuttle, L., Stockton, K.A. (2013). Comparison of three different dressings for partial thickness burns in children: study protocol for a randomized controlled trial. Trials 14,403, doi: 10. 1186/ 174 5-6215-14-403.

6. P. Sreenivasa, Purendar Reddy Perur. A clinical study of collagen dressing over silver sulphadiazine dressing in partial thickness burns. International Journal of Contemporary Medicine Surgery and Radiology. 2018; 3(1):43-46.

7. Chung J, Wang XQ, Lindberg FP, Frazier WA. Throm bospondin-1 acts via IAP/CD47 to synergize with collagen in alpha2beta1-mediated platelet activation. Blood. 1999;94;642-8. [PubMed] [Google Scholar]

8. Nagata H, Ueki H, Moriguchi T. Fibronectin: Localization in normal human skin, granulation tissue, hypertrophic scar, mature scar, progressive systemic sclerotic skin, and other fibrosing dermatoses. Arch Dermatol. 1985; 121:995–9. [PubMed] [Google Scholar]

9. Motta G, Ratto GB, De Barbieri A, Corte G, Zardi L, Sacco A, et al. Can heterologous collagen enhance the granulation tissue growth? An experimental study. Ital J Surg Sci. 1983; 13:101–8. [PubMed] [Google Scholar]

10. G. Lszvoic, M. Colic, M. Grubor, and M. Jovanavic. The Application of Collagen Sheet in Open Wound Healing. Ann Burns Fire Disasters. 2005 Sep 30; 18 (3): 151-156.

11. Rodgers GL, Moten son J, Fischer M, Lo A, Cress well A, Long SS. Predictors of inbfectiousb com plicaitons after burn injuries binb children. Pediatr infect Dis J 2000; 19:990-5

12. White MC, Thornton K, Young AER. Early diag nosis and treatment of toxic shock syndrome in pediatric burns. Burns 2005; 31:193-7

13. Scott Conner. Burn area measurement by com puterized planimetry. J Trauma; 28(5):638-41

14. The critical evaluation of Lund and Browder Chart. Wound UK 2007; 3(3); 58-68.

15. Juan P Barret. Initial Management and Re suscitation. Principles and Practise of Burn Surgery. 1-32

16. Ana Cristina de Oliveria Gonzalez, Tila Fortuna Costa, Zilton de Araujo, and Alena Ribeiro Alves Peixoto Medrado. Wound Healing-A Literature Review. An Bras Dermatol.2016 Sep-Oct; 91(5):614-620.

17. Wallace HA, Basehore BM, Zio PM. Wound Healing Process. Star Pearls Publishing LLC. Aug 10, 2019.

18. Lindsey Carswell; Judith Borger. Hypertrophic Scarring Keloids. Campbell Un. Scool of Osteopathgic Medicine Jan 27, 2019.

19. Callie M. Thompson, MD, Ravi F. Sood, MD and Nicole S. Gibran, MD; "What Score on the Vancouver Scar Scale constitutes a hypertrophic scar? Results from a survey of North American burn-care providers", Burns: Journal of the International Society for Burn Injuries.

20. Shailaja S. Jaya want, Anuradha V. Pai. A Com parative Study of Pain Measurement Scale in Acute Burn Patients. The Indian Journal of Occupational Therapy: Vol. XXXV: No. 3, Feb 2003.

21. B. Novelli, D. Melandri, G. Bertlotti, G. Vidotto; "Quality of life Impact as outcome in burn patients". 2009 Jan-Mar;31 (1 Suppl A): A58-63. [PubMed]

22. Lawren H. Daltroy et al. American Burn Association/ Shriners Hospitals for Children Burn Outcomes Questionnaire: Construction and Psychometric Properties. Journal of Burn Care & Rehabilitation • January 2000. [PubMed]

23. Margriet E. van Baar et al. Reliability and Validity of Dutch Version of the American Burn Association/ Shriners Hospital for Children Burn Outcomes Questionnaire (5-18 years of age). Journal of Burn Care and Research, Volume 27, Number 6, 2006.

24. Owens N. Use of pressure dressings in treatment of burns and other wounds. The Surgical Clinics of North America 1943; 23:1354-66.

25. Purna Sai, Mary Babu. Collagen based dressings – a review. Burns 2000; 26: 54 – 62.

26. Pruitt. B A: Characteristics and use of biological dressing and skin substitutes. Arch Surg 1984; 19: 312

27. K. Mathangi Ramakrishnan, M. Babu, Mathivanan, V, Jayaramn and J. Shankar. Advantages of collagen based dressings in the management of superficial and superficial partial thickness burns in children. Ann Burns Fire Disasters. 2013 Jun 30; 26(2) : 98 – 104.

28. Selvaraj Dhivya, Vishwanadha Vijaya Padma and Elango Santhini. Wound Dressings – A Review. 2015 Nov 28.

29. Gupta R L et al. Role of collagen sheet cover in burns – a clinical study. Indian Journal of Surgery 1978; 40(12):646

30. Mukund B. Tayade, Girish D. Bakhshi, Nab Kishor Haobijam. A Comparative Study of Collagen Sheet Cover Versus 1 % Silver Sulphadiazine in Partial Thick ness Burns, 2014.

31. Marily Kwolek, Dhanikachalam, R P Narayan et al. A comparative second-degree burn treatment trial of collagen dressing vs silver sulphadiazine alone at 31st annual meeting of society for bio metricals, 2006.

32. Gerding RL, Fratianne R. Biosynthetic skin sub stitutes versus 1% silver sulphadiazine for treatment of inpatient partial thickness thermal burns. J Trauma 1988; 28 :1265.

33. 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.

34. Pancy Sonia Moses, Sharad Gova, Sachin Verma, Rajkumar Mathur; A Comparative Study between Colla

gen and Simple Paraffin Dressing Applied on Skin Graft Donar Site with Special Emphasis on Vancouver Scar Scale and Patient & Observer Scar Assessment Scale (POSAS). Feb 2014.

35. Mohan T, Arvind Naik, T.R Nagarjuna; "Burns – A Comparative Study between Conventional and Collagen Dressing".