



Comparative study of collagen sheet versus paraffin gauze with silver sulfadiazine cream dressing for superficial partial thickness burn wounds: A Cross- Sectional Study.

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Abstract

Background

It has been observed that a major health issue that generally affects both children and adults is burns. The superficial dermal layer and the epidermal skin layer are both impacted by superficial burns. In cases of deep or full-thickness burns, deeper dermal tissues, including blood vessels and nerves, may sustain damage.

Objectives

The need to conduct the study was mainly to compare the effectiveness of collagen sheet vs SSD with paraffin gauze dressing clinically for superficial partial thickness burn management.

Materials and Methods

It was a cross-sectional study. The study was carried out at the Department of Plastic and Reconstructive Surgery, Patna Medical College and Hospital (PMCH), Patna, Bihar, India. The study took place for one year, i.e., from October 2023 to October 2024. In all, 30 participants were enrolled. Twenty patients received traditional SSD with paraffin gauze dressing, while ten patients received collagen dressing.

Results

The study included 30 patients (mean age 32.5 ± 8.4 years; 60% male, 40% female; mean burn size 8.6% TBSA), with collagen dressing showing significantly fewer dressing changes, reduced analgesic use, faster healing, and lower infection rates compared to SSD with paraffin gauze. In most cases, Group B patients needed analgesic treatment for a week or longer, whereas Group A patients needed oral analgesics for two to three days. Following three weeks of monitoring, every incision had fully healed.

Conclusion

The study found that when it came to treating superficial partial thickness burns, collagen sheet dressing worked better than SSD with paraffin gauze.

Recommendation

Collagen dressing is recommended as a superior alternative to SSD with paraffin gauze for managing superficial partial thickness burns due to its faster healing and reduced patient discomfort.

Keywords- Silver sulfadiazine, Burns, Wound Healing, Collagen sheet, Dressing

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Introduction

It has been observed that a major health issue that generally affects both children and adults is burns. The superficial dermal layer and the epidermal skin layer are both impacted by superficial burns. In cases of deep or full-thickness burns, deeper dermal tissues, including blood vessels and nerves, may sustain damage. The goal of treatment for burn injuries is to prevent infection and encourage healing while producing aesthetically pleasing outcomes. Currently, a large range of wound care products is available to accomplish these objectives [1].

Longer hospital stays, higher treatment expenses, and delayed wound healing are common outcomes of secondary wound infections [2]. Since ancient times, silver's antibacterial qualities have been recognized. When silver complexed with propylene glycol, stearyl alcohol, and isopropyl myristate in the 1970s, silver sulfadiazine (SSD) was created. When antibiotic sulfadiazine was added to this compound, the antibacterial properties of sulfadiazine and the inhibitory activity of silver were united into a single product. As a result, the medication was only applied twice a day. Unlike silver ions, which affected the bacterial energy system, this silver complex affected the bacterial wall [3].

The primary issue with SSD dressing, however, is the systemic absorption of silver, which persists in the body long after dissociation [4]. Another issue with traditional dressings is the requirement for numerous, painful dressing changes every day or every other day, particularly in pediatric patients, where anesthetic services are frequently required.

Biological dressings, which form a barrier between ambient germs and wound surfaces, are part of the alternative management strategy. In addition to being natural, nonimmunogenic, nonpyrogenic, hypoallergenic, and painless, collagen dressings offer additional benefits over traditional dressings. It works by promoting angiogenesis, increasing the metabolic activity of granulation tissue, and offering a wound bed for fibroblast migration [5, 6].

In India, recently developed collagen-based bandages are frequently utilized to treat acute burn wounds [7]. Collagen dressings might provide the perfect environment for bacteria to colonize, which would cause exudation and slow the healing of wounds. Infections were observed in wounds that were of partial thickness due to burns in 19% of the participants who further required either redressing or removal. Low oxygen tension, dehiscence of the wound, and the disintegration of the preexisting matrix of cells are all consequences of this infection [8].

The need to conduct the study was mainly to compare the effectiveness of collagen sheet vs SSD with paraffin gauze dressing clinically for superficial partial thickness burn management.

Methodology

Study Design and Setting

It was a cross-sectional study. The study was carried out at the Department of Plastic and Reconstructive Surgery, Patna Medical College and Hospital (PMCH), Patna, Bihar, India. The study took place for one year, i.e., from October 2023 to October 2024.

Study Population

In all, 30 participants were enrolled. Participants who had superficial partial thickness burns of less than 15%, arrived at the emergency outpatient department within 24 hours, and showed no symptoms of infection were eligible to participate. Immunocompromised patients, patients with electric, chemical, or inhalational burns, and patients of very old ages were excluded from the study. Twenty patients received traditional SSD with paraffin gauze dressing, while ten patients received collagen dressing.

Data Collection

The requirement for analgesics, the use of one or more dressing techniques, the time it took to change the dressing, the length of time it took for the wound to fully heal, and the presence of infections were among the data gathered for the study.

Study Procedure

Every patient was given the option to choose between the two treatments, and they did so independently. The Parkland formula was followed for performing fluid resuscitation. Before dressing, the wound was cleaned with regular saline. Clinical outcomes were monitored on a regular basis until the burn wound healed.

Sample Size Determination

The sample size of 30 was determined based on the feasibility and patient flow in the department during the study period. As this was an exploratory study aimed at comparing outcomes between two commonly used dressing methods in our setting, a smaller sample was considered acceptable to generate preliminary data and inform future larger-scale studies.



Bias

As patients were given the freedom to choose their treatment modality, selection bias could not be eliminated. However, efforts were made to minimize bias by applying uniform inclusion and exclusion criteria, ensuring that wound cleaning procedures and fluid resuscitation (using the Parkland formula) were standardized for all participants, and by monitoring clinical outcomes using the same assessment criteria throughout follow-up.

Statistical Analysis

Data were initially entered in Microsoft Excel. The data has been presented as the number of participants (n) and percentages (%).

Ethical Clearance

Informed consent had been taken from all participants. Ethical approval for the study was obtained from the Institutional Ethics Committee of Patna Medical College and Hospital, Patna, Bihar, India.

Results

During the study period, 42 patients with burn injuries presented to the Department of Plastic and Reconstructive Surgery, PMCH. Of these, 35 patients were screened for eligibility. Five patients were excluded: three had chemical or electrical burns, one presented more than 24 hours after injury, and one was immunocompromised. Finally, 30

patients met the inclusion criteria and consented to participate in the study. All 30 patients completed the intervention and follow-up, and their data were included in the final analysis.

Descriptive Data

The study included 30 participants, comprising 18 males (60%) and 12 females (40%). The mean age of participants was 32.5 ± 8.4 years (range: 18–48 years). The majority of patients sustained burns due to scald injuries (63%), followed by flame burns (27%) and contact burns (10%). The average burn size was 8.6% TBSA (range: 4–15%). No significant differences were observed in baseline characteristics (age, sex distribution, or TBSA) between the collagen group (Group A) and the SSD with paraffin gauze group (Group B).

Of the 30 patients in the study, 10 received collagen sheet dressing (Group A) and 20 received SSD dressing in addition to paraffin gauze (Group B). Group B needed to have several dressing changes (usually seven to ten times), whereas Group A only needed one dressing when the collagen sheet was applied. In most cases, Group B patients needed analgesic treatment for a week or longer, whereas Group A patients needed oral analgesics for two to three days. Following three weeks of monitoring, every burn wound had fully healed. The clinical results of collagen sheets and SSDs with paraffin gauze for superficial partial thickness burns are compared in Table 1.

Table 1. Comparative Analysis of Clinical Outcomes Between Collagen Sheet and SSD with Paraffin Gauze in Superficial Partial Thickness Burns

Parameters	Collagen Dressing (n=10)	SSD with paraffin gauze dressing (n=20)
Need for Analgesia		
2 days	06 (60%)	00 (0%)
3-7 days	04 (40%)	10 (50%)
>7 days	00 (0%)	10 (50%)
Dressing Change		
1 time	09 (90%)	00 (0%)
2-6 times	01 (10%)	06 (30%)
7-10 times	00 (0%)	14 (70%)
Duration of Complete Healing		
7-14 days	08 (80%)	07 (35%)
15-21 days	02 (20%)	13 (65%)

Infections		
Infected	01 (10%)	13 (65%)
Not infected	09 (90%)	07 (35%)



Figure 1. Collagen dressing after 1 week.



Figure 2. Collagen dressing at after 2 weeks.

Discussion

In managing burn wounds, the ultimate objective was to heal fully in the shortest period of time and restore almost normal skin texture and color. For management of burn wounds, debridement, cleansing, and creating a moist environment to promote the process of healing naturally. As a result, the perfect dressing material must keep the area wet, serve as a

barrier against harmful bacteria, and allow for the free passage of gases. In many regions of the world, SSD is still the accepted antibacterial treatment for burn injuries. Another crucial factor for burn wounds is patient comfort during dressing changes [9].

Newer silver dressings with better delivery methods have been made possible by technological advancements, which



are meant to increase effectiveness while reducing negative effects. Since the Roman era, silver's antibacterial properties have been known [10]. Along with silver nitrate solution, which is aqueous in nature, the dressing methods were also used in burn management and treatment, which helped in resisting several microorganisms, such as bacteria, fungi, and yeasts. Also, dressing played an important role in the healing of wounds [11].

Collagen sheet dressings were found to provide superior pain management in this trial, requiring less analgesic and, in the majority of cases, no dressing changes. When treating burn patients using slow-release dressings in sustained mode, coated with silver, recently developed dressings for the wound, it is appropriate to consider the potential for a toxic silver effect. Because these dressings are so expensive, they are not accessible in environments with minimal resources. Traditional dressings using SSD cream and gamzee barrier continue to be the preferred method in many of these places [3].

Daily to alternate-day dressing was necessary for traditional SSD dressing. The superiority of collagen sheet dressing over traditional dressings has been shown by this study. In addition to being linked to improved healing and lower infection rates, they also markedly reduced patient pain. The pain of traditional dressings was noted in one study as being significant in the pediatric age range [12].

To distribute the medication in a controlled way, a reconstituted collagen scaffold filled with SSD-loaded alginate microspheres was formulated in yet another study, which revealed that the collagen-based scaffold impregnated with alginate microspheres loaded with SSD may administer SSD in a regulated manner, prevent infection for a longer period of time with fewer dressing changes, and facilitate wound assessment [13].

Generalizability

The findings may be generalized to similar clinical settings with patients presenting with superficial partial thickness burns of <15% TBSA.

Conclusion

The study found that when it came to treating superficial partial thickness burns, collagen sheet dressing worked better than SSD with paraffin gauze for superficial partial thickness burns. Less discomfort, fewer dressing changes, decreased infection rates, and quicker wound healing were the outcomes. Collagen sheets are therefore a superior

substitute for clean, non-infected superficial partial thickness burns.

Limitations

The study's sample size was one of its primary drawbacks; a larger sample would have produced better findings. Another disadvantage of the study was that it was only carried out at one center.

Recommendations

Collagen dressing may be considered an effective alternative to SSD with paraffin gauze for selected burn patients in resource-limited settings.

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Source of Funding

This study received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

Availability of Data

Data supporting this study are available from the corresponding author upon reasonable request.

Authors' Contribution

All authors contributed to study conception, data collection, analysis, and manuscript preparation.

List of Abbreviations

PMCH- Patna Medical College and Hospital

SSD- Silver sulfadiazine

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