International Journal of Biomedical and Advance Research
ISSN: 2229-3809 (Online); 2455-0558 (Print)
Journal DOI: https://doi.org/10.7439/ijbar
CODEN: IJBABN

Original Research Article

Comparison between Silver sulfadiazine and Sustained-release silver dressings in the treatment of burns

Hemlata Gupta[1], Ram Krishna Gupta[*2]

[1]*Assistant Professor, Department of Physiology, Lakhiram Agrawal Medical College, Raigarh, Chhattisgarh*
[2]*Consultant, Burn's Unit, Birla Hospital, Gwalior, M.P. India*

Abstract

Background: There has been an increased use of dressings containing silver in recent days. As many studies showings the impact of sustained-release silver foam dressings on microbial assay, there is a scarcity of studies on clinical and economical.
Objectives: To investigate comparison between sustained-release silver dressings and 1% silver sulfadiazine (SSD) with respect to pain relief, its impact on wound healing, and hospital stay in patients with burns.
Material and Methods: Hospital Based Prospective study was conducted in Burns Unit of Birla Hospital, Gwalior for a period of 1 year were 40 burns patient were evaluated. 40 cases were divided into 2 groups (Group A- patients who had dressing with 1% SSD and Group B- patients who had dressing with sustained-release silver dressing. Epi-info 7.0 software was used for analysis.
Results: Days of stay in hospital are less in patients who were dressed with sustained release silver dressing (Group B) as compared to Group A($p<0.05$). Percentage of wound healing increases from 5th day to 20th day in both the groups but significant increase was seen on 15th and 20th day in Group B. ($P<0.05$).
Conclusion: Comparative study shows that sustained-release silver dressing has faster wound healing, lesser pain with earlier hospital discharge than SSD.
Keywords: 1% SSD, burn, visual analog score, wound healing.

***Correspondence Info:**
Dr. Ram Krishna Gupta,
Consultant, Burn's Unit, Birla Hospital,
Gwalior, M.P. India

***Article History:**
Received: 16/03/2019
Revised: 17/04/2019
Accepted: 17/04/2019
DOI: https://doi.org/10.7439/ijbar.v10i4.5123

QR Code

How to cite: Gupta H. and Gupta R K. Comparison between Silver sulfadiazine and Sustained-release silver dressings in the treatment of burns. *International Journal of Biomedical and Advance Research* 2019; 10(4): e5123. Doi: 10.7439/ijbar.v10i3.5123
Available from: https://ssjournals.com/index.php/ijbar/article/view/5123

1. Introduction

Since the 1800s silver has been used as an antimicrobial. Silver has antiseptic, antimicrobial, and anti-inflammatory properties and is a broad-spectrum antibiotic. [1,2] Silver Sulfadiazine (SSD) cream has a relatively short action, its diffusion of the burn escharis poor, and it forms a pseudo-eschar. Both silver nitrate dressings and SSD cream require a high frequency of dressing changes. [3] Silver can be in different forms in different dressings. Some silver dressings release silver in a sustained manner, which improves the condition of wound by continuously acting as an effective cover over microorganisms. Silver is biologically active when it is in a soluble form, that is, as Ag^{+} or Ag^{0} clusters.

Research has demonstrated that sustained-release silver products have a bactericidal action providing an effective management of odour and exudates, thus reducing the risk for colonization and preventing infection. [4] There are many studies comparing the different silver dressings available by studying their antimicrobial spectrum; however, there is a dearth in literature for assessing the clinical impact including wound healing, hospital stay, and patient comfort. So, this study was planned which highlights the comparison between sustained-release silver dressings and 1% silver sulfadiazine (SSD) with respect to its impact on wound healing and comfort in patients with burns.

2. Materials and Methods

2.1 Study Area:

Patient admitted at Burns Unit of Birla Hospital, Gwalior (M.P.)

2.2 Study type:

This was a Hospital Based Prospective study.

2.3 Study population:

All the patients of admitted to Burns Unit.

2.4 Study duration:

1 year from September 2017 to August 2018.

2.5 Sampling technique:

Purposive Sampling Technique.

2. Sample Size:

Total 40 cases of Burns were admitted which were randomly divided into 20 patients in each group A and B.

2.7 Inclusion criteria

Patients' suffering from thermal burn injury between 20% total burn surface area (TBSA) and 60% TBSA and involving either the anterior or posterior parts of the trunk, belonging to the age group 18–60 years, and admitted within 48h of burn injury.

2.8 Exclusion criteria

The patients with burns caused by electrical or chemical injuries and the patients with burns with any co-morbidity or other associated injury were excluded from the study.

2.9 Methodology

The patients who were in the study were selected on alternate basis for both the types of dressings. Thereafter, they were divided into the following two groups:

Group A: Patients who had dressing with 1% SSD.

Group B: Patients who had dressing with sustained-release silver dressing

The patients belonging to Group A were dressed on alternate days and the patients fitting to Group B were dressed on every 6th day or earlier if soakage or purulent discharge or odour occurred. Analgesics were directed only before a change in the dressing according to the treatment protocol. Wound assessment was achieved only on the anterior and posterior parts of the trunk using graphs. The percentage of epithelialized wound was calculated and compared with both the groups. A regular assessment of the wound and the patient was performed using clinical parameters and photographs. Variables which are compared are Pain using visual analog score (VAS) at 5^{th}, 10^{th}, 15^{th}, and 20^{th} days. The percentage of wound healing at 5^{th}, 10^{th}, 15^{th}, and 20^{th} days on the anterior and posterior trunk and Hospital stay duration.

2.10 Consent Type:

Informed consent

2.11 Ethical Approval:

Study was approved by Institutional Ethical Committee.

2.12 Statistical Analysis

Data will be consolidated and entered a Microsoft Excel spreadsheet and then transferred to Epi info version (7.1.3.0. centre for disease control and prevention, Atlanta, Georgia, USA, 2013) software for analysis. Chi-square test will be used to find out the association. $P \leq 0.05$ will be considered as statistically significant.

3. Results

Table 1: Demographic details of the Patients (N=40)

Parameters	Group A (N=20)	Group B (N=20)	p-value
Age (years)	34.5	36.8	0.11
Gender			
Male Female	9 11	8 12	0.001*
Residence			
Urban Rural	8 12	6 14	0.003*
Education			
Literate Illiterate	4 16	5 15	0.02*
Hospital stay (Mean± SD)	22.4±4.22	15.4±4.2	0.005*

*p<0.05 is statistically significant

As per table 1 average for Group A is 34.5 years while that of Group B is 36.8 years but age has no significance. Surprisingly the study is female preponderance and from rural area with high illiteracy which is found to be significant. (p<0.05) and days of stay in hospital are less in patients who were dressed with sustained release silver dressing (Group B) as compared to Group A (p<0.05)

Table 2: Visual Analog Score the study participants

Days	Group A (N=20)	Group B (N=20)	p-value
5	7.2	4.4	0.005*
10	6.6	2.9	0.005*
15	3.2	2.4	0.003*
20	3.6	1.7	0.005*

*p<0.05 is statistically significant

As per table 2 VAS of study patients shows significant decrease in the frequency of the pain as the day increases. But the score of Group B is slightly less as compared to Group A which is significant. (p<0.05)

Table 3: Wound Healing (%) in study Patients

Days	Group A (N=20)	Group B (N=20)	p-value
5	16.20	15.21	0.21
10	25.26	28.94	0.11
15	42.24	58.60	0.001*
20	68.54	88.68	0.0001*

*p<0.05 is statistically significant

As per table 3 percentage of wound healing increases from 5^{th} day to 20^{th} day in both the groups but significant increase was seen on 15^{th} and 20^{th} day in Group B. (P<0.05)

4. Discussion

Burn wounds are usually treated by changing dressing or surgery. [5] Despite satisfactory wound healing outcomes, surgery is not suitable for all patients because of high cost. Change of dressing on the other hand is cheaper and mainly used nowadays in clinical practice; however, the wounds heal slowly. Accordingly, it is of great significance to select proper dressings to control local infections and to promote healing. Ideal dressings should be easily applicable, well-penetrating, and broad-spectrum, without drug resistance, local stimulation, or systemic adverse reactions.[6,7] SSD cream has been used as wound dressing for over three decades.[8,9] Recently, silver dressings have been used instead to resist pain and to accelerate wound healing following the mechanisms below.[10,11] The principal aim of wound management in burn care is to prevent nosocomial bacterial wound infection. Additionally, the wound healing should be promoted, and the pain should be minimized during the change of dressing, taking the cost burden under control. There are many studies introducing new types of silver dressings.[12,13] In our study, we compared sustained-release silver dressings with SSD dressings. In the present study the parameters of comparison such as patient comfort, hospital stay, wound healing percentage compared and statistically analyzed. We also saw an improved percentage of wound healing in the group with sustained-release silver dressings as compared to SSD. Aziz *et al*. said that silver-containing dressings and topical silver were either no better or worse than control dressings in preventing wound infection and promoting the healing of burn wounds.[14] Silverstein *et al* compared silver-containing silicon dressings and SSD and said that silver-containing soft silicone foam dressing was as effective in the treatment of patients.[15]

5. Conclusion

Comparative study shows that sustained-release silver dressing has faster wound healing, lesser pain with earlier hospital discharge than SSD. Though, there are various limitations of this study such as small sample size, single institution study, and limited follow up. Modern silver dressings are very important in the coming years for burn treatment; thus, its clinical efficacy is a very important subject in burn management.

Conflict of Interest- None declared
Source of Funding- None

References

[1]. Fong J. The use of silver products in the management of burn wounds: Change in practice for the burn unit at Royal Perth Hospital. *Prim Intent* 2005; 13:S16-22.

[2]. Demling R, DeSanti L. The role of silver technology in wound healing: Part 1: Effects of silver on wound management. *Wounds* 2001; 13 (Suppl A):4-15.

[3]. Hoffman S. Silver sulfadiazine: Anantibacterial agent for topical use in burns. *Scand J Plast Reconstr Surg* 1984; 18:119-26.

[4]. Deitch E, Marin A, Malakanov V, Albright JA. Silver nylon cloth: *In vivo* and *in vitro* evaluation of antimicrobial activity. *J Trauma* 1987; 27:301-4.

[5]. Yang B, Wang X, Li Z, Qu Q, Qiu Y. Beneficial effects of silver foam dressing on healing of wounds with ulcers and infection control of burn patients. *Pak J Med Sci* 2015; 31:1334-9.

[6]. Palmieri TL, Nelson-Mooney K, Kagan RJ, Stubbs TK, Meyer WJ 3rd, Herndon DN, *et al*. Impact of hand burns onhealth-related quality of life in children younger than 5 years. *J Trauma Acute Care Surg* 2012; 73 (3 Suppl 2):S197-204.

[7]. Mabrouk A, Boughdadi NS, Helal HA, Zaki BM, Maher A. Moist occlusive dressing (Aquacel ® Ag) versus moist open dressing (MEBO ®) in the management of partial-thickness facial burns: A comparative study in Ain Shams University. *Burns* 2012; 38:396-403.

[8]. Gravante G, Caruso R, Sorge R, Nicoli F, Gentile P, Cervelli V. Nanocrystalline silver: A systematic review of randomized trials conducted on burned patients and an evidence-based assessment of potential advantages over older silver formulations. *Ann Plast Surg* 2009; 63:201-5.

[9]. Muangman P, Pundee C, Opasanon S, Muangman S. A prospective, randomized trial of silver containing hydrofiber dressing versus 1% silver sulfadiazine for the treatment of partial thickness burns. *Int Wound J* 2010; 7:271-6.

[10]. Russell L. The CONTOP multinational study: Preliminary data from the UK arm. *Wounds* 2005; 1:44-54.

[11]. Lo SF, Chang CJ, Hu WY, Hayter M, Chang YT. The effectiveness of silver-releasing dressings in the management of non-healing chronic wounds: A meta-analysis. *J Clin Nurs* 2009; 18:716-28.

[12]. Rustogi R, Mill J, Fraser JF, Kimble RM. The use of Acticoat in neonatal burns. *Burns* 2005; 31:878-82.

[13]. White R, Cutting K. Exploring the effects of silver in wound management − What is optimal? *Wounds* 2006; 18:307-14.

[14]. Aziz Z, Abu S, Chong N. A systematic review of silver-containing dressings and topical silver agents (used with dressings) for burn wounds. *Burns* 2012; 38:307-18.

[15]. Silverstein P, Heimbach D, Meites H, Latenser B, Mozingo D, Mullins F, *et al*. An open, parallel, randomized, comparative, multicenter study to evaluate the cost effectiveness, performance, tolerance, and safety of silver-containing soft silicone foam dressing (intervention) vs silver sulfadiazine cream. *J Burn Care Res* 2011; 32:617-26.