

Comparison of Silver-Content Hydrofiber Dressing Material and Silver Sulphadiazine in Geriatric Burn Patients

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Abstract

Aim: Elderly burn patients often experience delayed wound healing and increased morbidity due to age-related physiological changes. Effective pain management and faster wound healing are crucial in this population. To compare the efficacy of silver-containing hydrofiber dressing (Aquacel® Ag) and 1% silver sulfadiazine (GSD) in the management of superficial partial-thickness burns in geriatric patients.

Methods: This retrospective study included 73 patients over 60 years of age treated for scald burns between 2009 and 2011. Patients were divided into two groups: Group I received Aquacel® Ag, and Group II received 1% GSD. Pain scores, dressing frequency, epithelialization time, and itching duration were recorded and analyzed using t-tests and chi-square tests.

Results: Group I required fewer dressing changes and reported significantly lower pain scores and required fewer analgesics compared to Group II ($p < 0.001$). Epithelialization occurred earlier in Group I, and itching duration was shorter ($p < 0.001$). Fewer hospital visits were needed in the Aquacel® Ag group which improved patient compliance and comfort.

Conclusions: Aquacel® Ag may represent a more effective alternative to GSD in geriatric burn patients in terms of pain reduction, fewer dressing changes, and faster healing. These advantages may improve outpatient management and reduce morbidity in elderly patients with burn injuries.

Keywords: Burn injuries; geriatric patients; silver sulfadiazine; Aquacel Ag; hydrofiber dressing; wound healing; pain management

1. Introduction

Elderly patients constitute up to 10% of the population suffering from burn injury. Significant advances in medicine lead to prolongation of human lifespan and an increase in the elderly population. As a result of all these, it is estimated that the elderly population is more exposed to burn injury. Elderly people have higher morbidity and mortality in burn injury compared to the normal population.^{1,2} Systemic problems such as chronic diseases such as diabetes, cardiovascular diseases, decrease in lung reserves with age, decrease in body mass indexes, deterioration of nutritional status, deterioration of endogenous anabolic hormones are risk factors that increase mortality and morbidity in elderly patients after burn injury.³⁻⁵

In addition, factors that affect the skin and wound healing, such as decreased epidermal cycle, reduction of skin appendages, thinning of the skin, decrease in collagen and matrix synthesis, decrease in fibroblasts and macrophages, are factors that affect the wound care of elderly patients after burn injury.^{6,7}

In this study, the effects of two wound care methods that we used in our clinic on pain and wound healing time were compared in a group of geriatric patients.

2. Materials and Methods

This study was carried out retrospectively after the approval of Başkent University Clinical Research Ethics Committee. In this study, our sample consists of 73 patients over the age of 60 who applied to Baskent University Ankara Hospital Emergency Service due to scald burns between 2009 and 2011. All of the patients in the study were patients with superficial partial thickness (2nd degree) scald burns and all patients were treated as outpatients. Aquacel® Ag was frequently used in the care of burn wounds in our center in 2010 and 2011, after obtaining the consent of the patients. In cases where patient consent could not be obtained, 1% GSD was used in

wound care. In 2009, wound care was routinely performed with 1% GSD. All 1% GSD applied and Aquacel® Ag patients who met the study criteria during the study dates were included in the study.

The patients were divided into two groups. Burn wound care was performed in 30 of 73 patients in group 1 using a silver-containing hydrofiber dressing (Aquacel® Ag, ConvaTec) (Group I). 1% silver sulfadiazine (GSD) (Silverdin®, Deva) was applied topically to 43 patients in group 2 (Group II).

2.1. Local Burn Care

After the burn wounds of the patients who applied to our center on the first day were evaluated, all wounds were dressed with standard wound care. 1% GSD was applied topically to the patients in Group I, and they were called to control for wound examinations and wound care at 2-day intervals. This process continued until the burn wound was completely epithelialized. For the patients in Group II, Aquacel® Ag dressing was applied by covering the wound in accordance with the wound dimensions. The next control of the patients in Group II were seen 9 or 10 days later. During this period, patients were called for control again if the wound exudate contaminated the dressing. The dressing was reopened and repeated with the same method as it was done for the first time, and the patients were called for control 9 or 10 days later.

After the decision for outpatient treatment was taken, analgesia was provided to all patients with paracetamol or a non-steroidal anti-inflammatory agent.

2.2. Control Inspections

During the controls, wound depth, presence of infection, analgesic needs, follow-up of epithelialization, patient compliance and comfort with the treatment were evaluated. In the presence of infection, the need for debridement and/or grafting was evaluated and swab cultures were taken. Antibiotics were given only to patients with positive culture results.

If patients complain of itching, an antihistamine with a sedative effect, such as hydroxyzine dihydrochloride, is given if the wound is still closed and dressing. If the wound is epithelialized, washing, moisturizers and massage are recommended in addition to antihistamines.

2.3. Pain Assessment

All patients were asked to rate the pain they felt during the treatment at each control examination between 0 and 10.

1st day numerical pain scale score: It is the pain score that the patients felt on the first day of treatment.

2nd day numerical pain scale score: It is the pain score that the patients felt on the second day of treatment.

Numerical pain scale score at follow-up: It is the average value of the pain scores that the patients felt after the first two days until the end of the treatment..

Numerical pain scale score throughout the entire treatment: It is the average value of all pain scores that patients have stated until the end of treatment, including the first 2 days of treatment.

Number of painful days in follow-up: It indicates the number of days that the patients took analgesics after the first two days until the end of the treatment.

Number of painful days during treatment: Indicates the number of days that patients took analgesics throughout the entire treatment, including the first two days.

2.4. Statistical Analysis

SPSS for Windows 13.0 program was used for statistical analysis in our study. Continuous variables were expressed as mean $\pm$ standard deviation. Student's t test was used for the comparisons between groups of normally distributed parameters. Chi-square test was used to evaluate categorical data. A P value of <0.05 was considered statistically significant.

3. Results

There were 30 patients in Group I (Aquacel® Ag) and 43 patients in Group II (GSD). Of the entire study group, 42 (57.5%) were female, while 31 (42.5%) were male. While 18 (60%) of the patients in Group I were female, 12 (40%) were male. While 24 (55.8%) of the patients in Group II were female, 9 (44.2%) were male. There was no statistically significant difference in gender distribution between the groups. ($p < 0.81$)

The demographic characteristics of the patients, burn width, pain scale scores, painful days and number of dressings, epithelialization time, onset and duration of itching are shown in Table 1.

Table 1

Demographic data and characteristics of patients

Variable	Group I (Aquacel® Ag)	Group II (1% GSD)	p
Number of patients (n)	30	43	
Female, n (%)	18 (60%)	24 (55.8%)	0.81
Male, n (%)	12 (40%)	19 (44.2%)	0.81
Burn width (%)	6.5 $\pm$ 1.2	6.7 $\pm$ 1.1	0.42
1st day pain score	6.8 $\pm$ 0.9	7.6 $\pm$ 1.0	0.002
2nd day pain score	5.1 $\pm$ 0.8	6.2 $\pm$ 0.9	<0.001
Follow-up pain score	2.4 $\pm$ 0.5	3.5 $\pm$ 0.6	<0.001
Overall treatment pain score	3.5 $\pm$ 0.6	4.8 $\pm$ 0.7	<0.001
Painful days in follow-up (days)	1.8 $\pm$ 0.6	3.2 $\pm$ 0.7	<0.001
Painful days during treatment (days)	3.0 $\pm$ 0.7	4.9 $\pm$ 0.8	<0.001
Number of dressings, mean $\pm$ SD	3.13 $\pm$ 0.34	4.90 $\pm$ 0.81	<0.001
Epithelialization time (days)	10.4 $\pm$ 1.1	12.1 $\pm$ 1.3	<0.001
Onset of itching (days)	6.53 $\pm$ 1.07	8.02 $\pm$ 1.12	<0.05
Duration of itching (days)	8.40 $\pm$ 1.13	9.86 $\pm$ 1.28	<0.05

4. Discussion

Successful burn care in these patients represents a major challenge, as the elderly population, one of the fastest growing populations, is also susceptible to burn injuries. Elderly patients have a different skin physiology, biology, and healing process. Especially in elderly patients; decreased epidermal cycle, thinning of the skin, decrease in collagen and matrix synthesis, decrease in fibroblasts and macrophages significantly delay skin and wound healing.^{8,9}

In our study, two wound care methods that we used in our clinic were compared in terms of wound healing and pain in elderly patients with scald burns. Pain is a very important issue to be considered in the treatment of burns. Since severe pain may occur during dressing in burn patients, analgesia should be applied. In these cases, the importance of analgesic treatment emerges when

the possible physiological effects as well as the psychological effects that increase the pain caused by trauma and burns are considered.^{10,11}

In our study, the elderly patients treated with Aquacel® Ag and the elderly patients treated with 1% GSD were compared in terms of pain. In the group using Aquacel® Ag; The numerical pain scale scores of the patients and the number of days they needed analgesics were found to be low during the follow-up and throughout the treatment, and there was a statistically significant difference between the two groups ($p < 0.001$). We think that this is due to the fact that fewer dressings were applied to the patients in the Aquacel® Ag group. The mean number of dressings in this group was 3.13 ± 0.34 (Table 1), and most of the dressings were applied in the first 2 days and are of great importance for wound evaluation. The third dressing in this group is the last dressing where the dressing is removed and is usually a painless procedure as the wound is epithelialized. In the 1% GSD group, the mean number of dressings was 4.90 ± 0.81 (Table 1). Since GSD is a water-based topical agent, it is easily applied in dressings due to its lack of adhesion to the wound, and thus can be easily removed from the wound.¹²

However, one of the important disadvantages of this agent in local wound care is that when combined with the wound exudate, it can produce a pseudo eschar and the wound depth can be misinterpreted.¹³

In addition, cleaning the layer formed by the wound exudate and forming a gel consistency in each dressing is necessary in order to prevent infection, but it is an important disadvantage in terms of contributing to the painfulness of the procedure.¹⁴

Another disadvantage is that local wound care must be done at 24-48 hour intervals. This is due to the higher number of dressings in Group I after the first 2 days until the epithelialization of the burned tissue; therefore, it contributes to higher pain scores and analgesic needs. Thanks to the high absorbcency of the hydrofiber dressing, it can be left on the wound surface for a longer period of time and allows the dressing to be changed less frequently, reducing care time and total wound care costs.^{15,16}

In the study of Caruso et al. in which they compared Aquacel® Ag and GSD in scald burns with a width of 20% or more and partial thickness, it was reported that the pain scores and the number of dressing changes were lower in the group using Aquacel® Ag.¹⁷

In the study of Muangman et al., it was shown that the recovery time was prolonged and the cost increased in the GSD group.¹⁸

In our study, pain scores, analgesic needs and dressing change numbers were found to be low in the group in which Aquacel® Ag was used, similar to the literature, and a statistically significant difference was found when compared with the group in which 1% GSD was used ($p < 0.001$). Although itching is very common after burns, it is a subject that has not been sufficiently discussed in the literature. One of the most important reasons for this is that a method to measure itching in a standardized manner has not been realized yet. Itching is common in healing or healed burn wounds. Factors such as physical activity, stress, and temperature can trigger or exacerbate itching. Generally, itching is greatest immediately after the wounds heal.^{19,20}

There is no definite data in the literature about how long itching lasts. In our study, the mean time of onset of itching and duration of itching during the treatment were determined as 6.53 ± 1.07 days and 8.40 ± 1.13 days, respectively, in patients treated with Aquacel® Ag for burn wound care. The same parameters were found to be 8.02 ± 1.12 days and 9.86 ± 1.28 days in patients who underwent burn wound care with GSD. In patients in the Aquacel® Ag group, the onset time of itching and the duration of itching during the treatment were found to be statistically significantly lower. This

is because we think that Aquacel® has positive effects of Ag on wound healing. An important point here is that after Aquacel® Ag is applied, the wound is usually kept closed until the end of the treatment, so patients who start itching complain about the wound being closed. In these cases, we prescribe a sedative antihistamine until the wound is opened in our clinic. We observed that most of the patients benefited from this treatment. After the wound is opened, we recommend massage and moisturizing creams with sedative antihistamines. Another advantage of the low number of dressings in elderly patients using Aquacel® Ag is that the patients in this study group are less likely to go to and from the hospital because they are an outpatient. In this way, we observed that patient comfort and treatment compliance were better.

5. Conclusion

In this retrospective clinical study, the use of Aquacel® Ag, a silver-containing hydrofiber dressing, in the treatment of superficial partial-thickness burns in elderly patients resulted in fewer dressing changes, lower analgesic requirements, reduced itching, and faster wound healing compared to 1% silver sulfadiazine. These advantages contributed to better outpatient management by increasing patient comfort and compliance—key factors in reducing morbidity in geriatric burn care. Given these clinical benefits, Aquacel® Ag may represent a favorable alternative in elderly burn patients, and larger prospective studies are warranted to further confirm these findings.

Statement of ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by Ankara Baskent University Institutional Review Board and Ethics Committee and supported by Ankara Baskent University Research Funding. The study was monitored by the local ethics committee with the decision dated 10.05.2011 and numbered KA 11/113.

genAI

No artificial intelligence-based tools or generative AI technologies were used in this study. The entire content of the manuscript was originally prepared, reviewed, and approved by both authors.

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Conflict of interest statement

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Availability of data and materials

The data and materials used in this project are available. The data can be accessed from the Hospital Information Management System of Ankara Baskent University Hospital IT department.

Author contributions

TAG; Concept, Design and Layout, Sources, Materials, Data Collection, Literature Review, Critical Review

AS; Data Collection, Analysis and Interpretation, Literature Review

AA; Data Collection, Literature Review

CA; Supervision

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