Original Article

Outcome Assessment of Steritin Tulle Gauze, Aquacel Ag and Kaltostat Dressing at Skin Graft Donor Sites

Hira Katpar¹*, Sara Noor², Rana Hassan Javaid³, Ghazanfar Ali Bajwa³, Farah Naz¹ and Abdul Rasool¹

¹Department of Plastic Surgery, PNS Shifa Hospital, Karachi, Pakistan
²Combined Military Hospital, Rawalpindi, Pakistan

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*Corresponding Author:
Hira Katpar
Department of Plastic Surgery, PNS Shifa Hospital, Karachi, Pakistan
h_saleem49@yahoo.com

INTRODUCTION

STSG is a common surgical procedure used to reconstruct defects due to trauma, deep burns, and flap donor sites [1-3]. STSG is harvested as whole epidermis with superficial dermis to cover a defect. The donor site of STSG is a concern for the patient due to pain, burning and discomfort rather than the recipient site in the early post-operative period [4-7]. The donor site is a partial-dermal thickness wound and should be seen as such, rather than a 'special' wound [8]. The donor site usually heals within 14 days of surgery by re epithelization [1, 7, 9]. Various dressing options are available for the donor site, each with its pros and cons. The ideal split-thickness skin graft donor site dressing should promote healing, minimize pain, prevent infection, result in minimal scarring, and be inexpensive and easy to use [10, 11]. Common dressing options include paraffin impregnated gauze, Kalginate dressings, and silver-containing dressings. Steritin tulle consists of a cotton leno weave fabric, impregnated with a base of white paraffin, anhydrous lanolin and 1.0% w/w framycetin sulphate, which is an antibiotic of the aminoglycoside group. Organisms sensitive to this include staphylococcus aureus, E. coli, klebsiella species, and some stains of...
**Methods**

It was a cross-sectional study conducted at a tertiary care hospital of Karachi. A total of 67 patients required the grafting during the study duration i.e. from April 2022 to September 2022. However, based on our inclusion criteria 60 patients were included in the study. The groups were randomly assigned to the study participants such as 20 patients per group. The groups were created on the basis of dressing options such as patients in Group A had non-adherent Steritin Tulle gauze dressing, Group B had Aquacel Ag dressing and group C had Kaltostat dressing. The outcomes of interest for the current study were assessment of donor site wound healing, pain, infection, and ease of dressing removal. The samples were recruited by non-probability consecutive sampling technique. The set inclusion criteria were patients with age of 18-60 years however, patients with diabetes, active smoking status, and those who were using anticoagulants were excluded from the study. Skin grafting was performed under general, spinal or regional anesthesia. Local anesthesia with lignocaine with adrenaline1% was infiltrated at the donor site. When more than 2 sheets of skin graft were required the donor, site was infiltrated with tumescent fluid made by adding 1 ml 1:1000 epinephrine and 15 ml of plain lignocaine diluted in 1 liter of normal saline. In all cases donor site hair was removed with clippers just before the surgery. Grafts were harvested as per size of wound. We used Zimmer dermatome with 3 in (7.6 cm) width plate with thickness of 8/1000 inch after wetting the area with normal saline gauze for smooth dermatome working. After graft harvest, donor site area was covered with normal saline wet gauze till dressing was done. In all patients the first layer of dressing was done 2 cm beyond the margins of wound, the second layer consisted of roll gauze, then cotton roll and crepe bandage which were same in all the dressing groups. Pain scoring was done by Numerical Rating Scale (NRS) from 1 to 10 and was used at op day, post op day 1,3,5,7 days. All the donor site dressings were checked for any discharge, infection till the patient was discharged. Dressings were removed by patients at home on day 14 while taking bath. On removal of the donor site dressing the patients were asked for ease of removal from scale 0 to 10. 10 being the easiest to remove. Follow up was done within 3-4 weeks post op.

The data were collected by filling proforma, follow up visits and pictures. Data were analyzed by SPSS software version 22.0, one sample anova followed by post hoc tukky’s test was applied to compare the mean difference in the pain scores among the groups and chi-square test was applied at 95% confidence interval to compare the infection rate and Ease of dressing removal. A p-value of less than 0.05 were considered as significant.

**Results**

Out of 60 patients 17 were female (26.7%). The mean age of study participants was 36.3 ± 10.7 years. Most of the cases who needed STSG were of trauma n=33 (55%), burns n=18 (30%), and flap donor sites n=09 (15%) table 1 shows the mean age, and group distribution of study participants.

<table>
<thead>
<tr>
<th>Reason of grafting</th>
<th>Total no. of patients N= 60 (100%)</th>
<th>Group A Steritin Tulle n=20</th>
<th>Group B Aquacel Ag n= 20</th>
<th>Group C Kaltostat n=20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>36.3 ± 10.7</td>
<td>35.8 ± 10.9</td>
<td>36.4 ± 9.9</td>
<td>36.8 ± 12.1</td>
</tr>
<tr>
<td>Trauma</td>
<td>33 (55%)</td>
<td>9 (45%)</td>
<td>11 (55%)</td>
<td>13 (65%)</td>
</tr>
<tr>
<td>Burns</td>
<td>18 (30%)</td>
<td>8 (40%)</td>
<td>7 (35%)</td>
<td>3 (15%)</td>
</tr>
<tr>
<td>Flap donor site</td>
<td>9 (15%)</td>
<td>3 (15%)</td>
<td>2 (10%)</td>
<td>4 (20%)</td>
</tr>
</tbody>
</table>

The Anova analysis showed that all the dressings were effective in with time pain among all the group participants was reduced significantly (p=0.004), however intergroup comparison highlighted that less pain was observed in patients with Aquacel Ag dressing in the early post-operative period compared to the other two groups (p-value<0.001) table 2 highlights the difference in pain scale at different days.
**Table 2**: Difference in pain scale at different days

<table>
<thead>
<tr>
<th>Pain at</th>
<th>Steritin Tulle (n=20)</th>
<th>Aquacel Ag (n=20)</th>
<th>Keltostat (n=20)</th>
<th>Inter group comparison p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>3.15 ± 1.18</td>
<td>2.5 ± 0.9</td>
<td>6.0 ± 1.5</td>
<td>0.004*</td>
</tr>
<tr>
<td>Day 3</td>
<td>2.31 ± 1.26</td>
<td>2.4 ± 1.99</td>
<td>4.7 ± 1.1</td>
<td></td>
</tr>
<tr>
<td>Day 5</td>
<td>0.75 ± 1.06</td>
<td>0.55 ± 0.75</td>
<td>3.5 ± 1.05</td>
<td></td>
</tr>
<tr>
<td>Day 7</td>
<td>0.6 ± 1.046</td>
<td>0.35 ± 0.75</td>
<td>1.95 ± 1.31</td>
<td></td>
</tr>
<tr>
<td>Post hoc analysis p-value</td>
<td>0.041</td>
<td>0.001*</td>
<td>0.051</td>
<td></td>
</tr>
</tbody>
</table>

*significant p-value

The Chi square analysis showed on the removal of dressing at 14th day, Keltostat dressing was seemed to be the easiest to remove (p=0.025). There was less pain on dressing removal in Group C keltostate dressing than Group A and Group B (p-value=0.001). All donor sites healed uneventfully within 14 days. No infections were observed in any of the groups (Table 3).

**Table 3**: Comparison of infection and discomfort at the time of dressing removal

<table>
<thead>
<tr>
<th>Variables</th>
<th>Steritin Tulle (n=20)</th>
<th>Aquacel Ag (n=20)</th>
<th>Keltostat (n=20)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection</td>
<td>Yes 20(100%)</td>
<td>Yes 20(100%)</td>
<td>Yes 20(100%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Easy to remove</td>
<td>Yes 8(40%)</td>
<td>Yes 10(50%)</td>
<td>Yes 10(50%)</td>
<td>0.025*</td>
</tr>
<tr>
<td>Pain at the time of removal</td>
<td>Yes 6(30%)</td>
<td>Yes 14(70%)</td>
<td>Yes 11(55%)</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>0.041</td>
<td>0.001*</td>
<td>0.051</td>
<td></td>
</tr>
</tbody>
</table>

*significant p-value

**Discussion**

Split-thickness graft donor site is usually expected to heal like any abrasion. Patients however sometimes complain of post-operative pain and discomfort on removal of dressings [14], like all surgical procedures there is a small chance of wound infection. There are many dressings available for graft donor site each one of them having different properties. Till date no ideal dressing is available for donor site. The present study aimed to compare the effectiveness of three dressing options for Split Thickness Skin Graft (STSG) donor sites. Not many large studies have been done comparing these dressings for STSG donor site. Hassanpour et al., also compared 60 patients for 3 dressings which were different from our dressings [15]. Barnea included 23 patients in two group’s comparison and Lohsiriwat included 20 patients. Patients were asked on the post op day 1, 3, 5, and 7 for pain, scale from 0 to 10. There was less pain observed in Group B Aquacel Ag dressing compared to Group A Steritin tulle and Group C Keltostat dressing. Barnea et al., and Lohsiriwat et al., compared the Aquacel dressing with simple paraffin gauze in their study and found Aquacel causes less pain and rapid epithelization than paraffin gauze [16, 17]. Cihantimir et al., has compared Keltostat with Jelonet and observed less pain, early healing and ease of removal of dressing in Keltostat than Jelonet [18]. Our findings are consistent with other studies that have compared these dressings in different types of wounds. For example, a study by Jude et al., compared Aquacel Ag and Calcium Alginate dressings in the treatment of diabetic foot ulcers and found that Aquacel Ag silver dressings were associated with favorable clinical outcomes compared with Calcium Alginate dressings, specifically in ulcer depth reduction and in infected ulcers requiring antibiotic treatment [19]. In a study by Barnea et al., The results indicated that patients treated with Aquacel experienced significantly less pain and a more rapid rate of epithelialization compared with patients treated with mesh paraffin gauze dressing [16]. Dornseifer et al., compared polyurethane and aquacel in their study and found polyurethane dressing superior than aquacel in terms of infection, healing and ease of removal [20]. Brenner et al., compared tegaderm and keltostat in 40 patients. They found tegaderm superior to keltostat in healing and pain [21]. Beldon et al., compared 4 dressing and found paraffin gauze is causing more pain and trauma on removal [22].

**Conclusions**

In conclusion, our study found that the use of Aquacel Ag and Keltostat dressing can be more beneficial for STSG donor sites. There is less pain observed in patients whom we use Aquacel Ag dressing. And the donor site dressed with Keltostat is easy to remove compared to Aquacel Ag and Steritin tulle dressing.

**Authors Contribution**

Conceptualization: HK
Methodology: SN
Formal analysis: RHJ, GAB
Writing-review and editing: HK, FN, AR

All authors have read and agreed to the published version of the manuscript.

**Conflicts of Interest**

The authors declare no conflict of interest.

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**References**


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