DOI: https://doi.org/10.54393/pjhs.v4i06.858

PAKISTAN JOURNAL OF HEALTH SCIENCES

https://thejas.com.pk/index.php/pjhs

Volume 4, Issue 6 (June 2023)

Original Article

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

Hira Katpar[1*], Sara Noor[1], Rana Hassan Javaid[1], Ghazanfar Ali Bajwa[2], Farah Naz[1] and Abdul Rasool[1]

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

ARTICLE INFO

Key Words:

Donor Site, Dressing, STSG, Aquacel Ag, Steritin Tulle, Keltostat

How to Cite:

Katpar, H., Sara Noor, Rana Hassan Javaid, Bajwa, G. A., Farah Naz, & Abdul Rasool. (2023). Outcome Assessment of Steritin Tulle Gauze, Aquacel Ag and Kaltostat Dressing at Skin Graft Donor Sites: Assessment of Steritin Tulle Gauze, Aquacel Ag and Kaltostat. Pakistan Journal of Health Sciences, 4(06). https://doi.org/10.54393/pjhs.v4i06.858

***Corresponding Author:**

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

Received date: 7th June, 2023
Acceptance Date: 28th June, 2023
Published Date: 30th June, 2023

ABSTRACT

Split Thickness Skin Graft (STSG) is a common surgical procedure used to reconstruct defects in plastic surgery. Various dressing options are available for the donor site, each with its pros and cons. **Objective:** To compare the effectiveness of three dressing options for STSG donor sites. **Methods:** The study was conducted from April to September 2022. Sixty patients were randomized equally into three groups and assessed for wound healing, pain, infection, and ease of dressing removal. The dressing options were Steritin Tulle gauze, Aquacel Ag, and Kaltostat. **Results:** All donor sites healed within 14-days, and no infections were observed. Aquacel Ag dressing caused less pain in early post-operative days, and Kaltostat dressing was easier to remove compared to Steritin dressing. **Conclusions:** Our study found that the use of Aquacel Ag and Kaltostat dressing can be more beneficial for Split Thickness Skin Graft donor sites

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

DOI: https://doi.org/10.54393/pjhs.v4i06.858

pseudomonas aeruginosa [12]. Aquacel Ag hydrofibre dressing has unique composition, with combination of gelling properties of hydrofibre and 1.2% (w/w) silver. Ionic silver breakdowns biofilm to expose bacteria, kills broad spectrum of bacteria, and prevents biofilm formation. Hydrofibre technology locks in excess exudates, bacteria and biofilm to help minimize cross infection and prevents maceration. It maintains optimal moisture and eliminates dead space where bacteria grow enhancing the healing process and reduces the risk of infection. Hydrofibre also forms a cohesive gel which helps to minimize pain. Kaltostat (sodium-calcium alginate dressing) is a fibrous non-woven sodium-calcium alginate dressing that gels as a result of exudate absorption and ion exchange between calcium and sodium ions. It is able to absorb up to 20 times its weight in exudate. It forms a hydrophilic gel is easy to apply is non-adherent and can be removed in one piece [13]. In our hospital, dressing with Steritin Tulle gauze and multiple layers of pads has been the first choice of dressing due to ease of application, easy availability and low cost. The standard meshed paraffin gauze dressing is considered non-adherent due to the paraffin component. However, it adheres to the wound surface and it sometimes gets soaked. Also, the patient complains of more pain at donor than the recipient site in the early postoperative period. We conducted this study to see which of these three dressings would suit our patients the most, in terms of less pain, early healing and ease of removal.

METHODS

It was a cross-sectional study conducted at 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 1: Mean age, and group distribution of study participants

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

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.

DOI: https://doi.org/10.54393/pjhs.v4i06.858

Table 2: Difference in pain scale at different days

Pain at	Steritin Tulle (n=20)	Aquacel Ag (n=20)	Keltostat (n=20)	Inter group comparison p-value
Day 1	3.15 ± 1.18	2.5 ± 0,9	6.0 ± 1.5	0.004*
Day 3	2.31 ± 1.26	2.4 ± 1.99	4.7 ± 1.1	
Day 5	0.75± 1.06	0.55 ± 0.75	3.5 ± 1.05	
Day 7	0.6 ± 1.046	0.35±0.75	1.95 ± 1.31	
Post hoc analysis p-value	0.041	0.001*	0.051	

*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

Variables	Steritin Tulle (n=20)		Aquacel Ag (n=20)		Keltostat (n=20)		p-value
	Yes	No	Yes	No	Yes	No	
Infection	0	20 (100%)	0	20 (100%)	0	20 (100%)	1.000
Easy to remove	12 (60%)	8 (40%)	10 (50%)	10 (50%)	16 (80%)	4 (20%)	0.025*
Pain at the time of removal	6 (30%)	14 (70%)	9 (45%)	11 (55%)	3 (15%)	17 (85%)	0.001*

*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]. Cihantimur *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 Kaltostat 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.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Das S, Singh A, Singh L, Sinam N, Singh S. A comparative clinical study of collagen and paraffin gauze dressing on skin donor site. Journal of Medical Society. 2020 Sep; 34(3): 162-. doi: 10.4103/jms.jms_25_21.

[2] García-Salinas AS, Mecott GA, García-Pérez M, Castro-Govea Y, Pérez-Porras S, Chacón-Moreno H, *et al*. Decreased pain in split-thickness skin graft

DOI: https://doi.org/10.54393/pjhs.v4i06.858

donor sites with the use of a non-adherent polyurethane dressing. Medicina Universitaria. 2015 Oct; 17(69): 196-202. doi: 10.1016/j.rmu.2015.07.001.

[3] Eskes AM, Brölmann FE, Gerbens LA, Ubbink DT, Vermeulen H. Which dressing do donor site wounds need? study protocol for a randomized controlled trial. Trials. 2011 Dec; 12(1): 1-6. doi: 10.1186/1745-6215-12-229.

[4] Asuku M, Yu T-C, Yan Q, Böing E, Hahn H, Hovland S, *et al*. Split-thickness skin graft donor-site morbidity: a systematic literature review. Burns. 2021 Nov; 47(7): 1525-46. doi: 10.1016/j.burns.2021.02.014.

[5] Rajasegeran DD, Aloweni F, Lim X, Sekaran SC, Nguyen CP, Zhang L, *et al*. A prospective comparative study on the effectiveness of two different non-adherent polyurethane dressings on split-thickness skin graft donor sites. Journal of Tissue Viability. 2022 Aug; 31(3): 531-6. doi: 10.1016/j.jtv.2022.04.007.

[6] Kanapathy M and Mosahebi A. Comparative study on the donor site aesthetic outcome between epidermal graft and split-thickness skin graft. International Wound Journal. 2019 Apr; 16(2): 354-9. doi: 10.1111/iwj.13039.

[7] Craig CK, Williams JW, Carter JE, Holmes JHJB. Bismuth/petroleum gauze plus high density polyethylene vs. bismuth/petroleum gauze: A comparison of donor site healing and patient comfort. Burns. 2022 Dec; 48(8): 1917-21. doi: 10.1016/j.burns.2022.01.006.

[8] Beldon P. Skin grafts 2: management of donor site wounds in the community. British Journal of Community Nursing. 2003 Sep; 8(Sup4): S6-14. doi: 10.12968/bjcn.2003.8.Sup4.11583.

[9] Serebrakian AT, Pickrell BB, Varon DE, Mohamadi A, Grinstaff MW, Rodriguez EK, *et al*. Meta-analysis and systematic review of skin graft donor-site dressings with future guidelines. Plastic and Reconstructive Surgery Global Open. 2018 Sep; 6(9): e1928. doi: 10.1097/GOX.0000000000001928.

[10] Kujur AR and D'Souza NT. Comparison of Three Methods of Dressings for Split Thickness Skin Graft Donor Site-Non-Woven Dressing Impregnated with Amorphous Hydrogel, Amorphous Hydrogel with Colloidal Silver and Conventional Paraffin Gauze Dressing. 2019 Dec; 6(12): 17-22. doi: 10.21276/ijcmr.2019.6.12.36.

[11] Akan M, Yildirim S, Misirlioglu A, Ulusoy G, Aköz T, Avc G. An alternative method to minimize pain in the split-thickness skin graft donor site. Plastic and Reconstructive Surgery. 2003 Jun; 111(7): 2243-9. doi: 10.1097/01.PRS.0000060087.93322.2F.

[12] Chhabra S, Chhabra N, Kaur A, Gupta N. Wound healing concepts in clinical practice of OMFS. Journal of Maxillofacial and Oral Surgery. 2017 Dec; 16: 403-23. doi: 10.1007/s12663-016-0880-z.

[13] Naseri E and Ahmadi A. A review on wound dressings: Antimicrobial agents, biomaterials, fabrication techniques, and stimuli-responsive drug release. European Polymer Journal. 2022 Jun; 173: 111293. doi: 10.1016/j.eurpolymj.2022.111293.

[14] Otene CI, Olaitan PB, Ogbonnaya IS, Nnabuko RE. Donor site morbidity following harvest of split-thickness skin grafts in South Eastern Nigeria. Journal of the West African College of Surgeons. 2011 Apr; 1(2): 86.

[15] Hassanpour SE, Moosavizadeh SM, Yavari M, Mofrad HR, Fadaei A. Comparison of three different methods of dressing for partial thickness skin graft donor site. World journal of Plastic Surgery. 2013 Jan; 2(1): 26.

[16] Barnea Y, Amir A, Leshem D, Zaretski A, Weiss J, Shafir R, *et al*. Clinical comparative study of aquacel and paraffin gauze dressing for split-skin donor site treatment. Annals of Plastic Surgery. 2004 Aug; 53(2): 132-6. doi: 10.1097/01.sap.0000112349.42549.b3.

[17] Lohsiriwat V and Chuangsuwanich A. Comparison of the ionic silver-containing Hydrofiber* and paraffin gauze dressing on split-thickness skin graft donor sites. Annals of Plastic Surgery. 2009 Apr; 62(4): 421-2. doi: 10.1097/SAP.0b013e31818a65e9.

[18] Cihantimur B, Kahveci R, Özcan M. Comparing Kaltostat with Jelonet in the treatment of split-thickness skin graft donor sites. European Journal of Plastic Surgery. 1997 Sep; 20: 260-3. doi: 10.1007/BF01159489.

[19] Jude EB, Apelqvist J, Spraul M, Martini J, Silver Dressing Study Group. Prospective randomized controlled study of Hydrofiber® dressing containing ionic silver or calcium alginate dressings in non-ischaemic diabetic foot ulcers. Diabetic Medicine. 2007 Mar; 24(3): 280-8. doi: 10.1111/j.1464-5491.2007.02079.x.

[20] Dornseifer U, Lonic D, Gerstung TI, Herter F, Fichter AM, Holm C, *et al*. The ideal split-thickness skin graft donor-site dressing: a clinical comparative trial of a modified polyurethane dressing and aquacel. Plastic and Reconstructive Surgery. 2011 Oct; 128(4): 918-24. doi: 10.1097/PRS.0b013e3182268c02.

[21] Brenner M, Hilliard C, Peel G, Crispino G, Geraghty R, O'Callaghan G. Management of pediatric skin-graft donor sites: a randomized controlled trial of three wound care products. Journal of Burn Care & Research. 2015 Jan; 36(1): 159-66. doi: 10.1097/BCR.0000000000000161.

DOI: https://doi.org/10.54393/pjhs.v4i06.858

[22] Beldon P. Comparison of four different dressings on donor site wounds. British Journal of Nursing. 2004 Mar; 13(Sup1): S38-45. doi: 10.12968/bjon.2004.13.Sup1.12541.