Assessment of Widely Used Dressing Materials in Split-Thickness Skin Graft Donor Sites

Sık Kullanılan Pansuman Malzemelerinin Kısmi Kalınlıkta Deri Grefti Verici Sahalarında Kullanımı

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ABSTRACT Objective: Split-thickness skin grafting is a widely used technique for the coverage of skin defects. Surgeons using split-thickness skin grafts regularly face with the different dressing options. Yet, no ideal method for the appropriate dressing is present currently. Here, five different dressing materials were used for split thickness skin graft donor sites. **Material and Methods:** Twelve patients undergoing elective split-thickness skin grafting were included in the study. Povidone iodine, vaseline, paraffin, scarlet red, and cellulose were used. The donor site was imaginary divided into 5 equal pieces, and subsequently the materials were applied on these pieces adequately. Postoperative pain, inspection of the donor site, epithelization time, and patient comfort were assessed. Preoperative and postoperative photographs, postoperative wound healing and the histological examination of the donor site for each dressing were also evaluated in the study. **Results:** Cellulose was the most convenient material with regard to pain, comfort, and photographs. However, there was no significant difference according to the histopathologic evaluation of the donor sites after intervention. **Conclusion:** We, suggest that cellulose coated with petrolatum is a good alternative in split thickness skin graft donor sites. We highly recommend this material for better cosmetic results, even in larger areas, especially in elders.

Key Words: Skin transplantation; skin care

ÖZET Amaç: Kısmi kalınlıkta deri grefti uygulaması cilt defektlerinin kapatılmasında yaygın olarak kullanılmaktadır. Kısmi kalınlıkta deri grefti verici saha bakımında cerrahlar değişik pansuman malzemeleriyle yüzleşmektedir. İdeal bir pansuman malzemesi kısmi kalınlıkta deri grefti verici saha defektlerinde henüz bulunamamıştır. Burada, kısmi kalınlıkta deri grefti verici saha bakımı için 5 değişik pansuman malzemesi kullanıldı. **Gereç ve Yöntemler:** Kısmi kalınlıkta deri grefti verici saha bakımı için 12 hastada povidon iyot, vazelin, parafin, antibiyotikli gazlı bez ve sellüloz kullanıldı. Kısmi kalınlıkta deri grefti verici saha 5 eşit parçaya ayrılarak her parçaya ayrı bir pansuman malzemesi uygulandı. Ameliyat sonrası ağrı, verici sahanın inspeksiyonu, epitelizasyon zamanı ve hasta konforu değerlendirildi. Ameliyat öncesi ve sonrası fotoğraflar, yara iyileşmesi ve histopatolojik değerlendirmeler de çalışmaya katıldı. Histopatolojik değerlendirme için insizyonel biyopsiler kısmi kalınlıkta deri grefti verici saha epitelizasyonu tamamlandığında alındı. **Bulgular:** Hastaların kısmi kalınlıkta deri grefti verici sahaları için ağrı, konfor, ameliyat öncesi ve sonrası fotoğraflar değerlendirildiğinde en anlamlı sonuç sellüloz kullanılan hastalarda elde edildi. Ancak epitelizasyon tamamlandıktan sonra alınan insizyonel biyopsiler sonucu histopatolojik olarak herhangi bir fark bulunmadı. **Sonuç:** Kısmi kalınlıkta deri grefti verici saha bakımında sellüloz iyi bir alternatiftir. Özellikle büyük greft verici sahalarının bakımında ve yaşlılarda bu malzemeyi daha iyi bir kozmetik sonuç elde edilebileceğini düşünerek önermekteyiz.

Anahtar Kelimeler: Deri grefti uygulanması; verici saha bakımı

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Tissue injury entails adequate coverage, but frequent failures usually require secondary interventions. Split-thickness skin grafting (STSG) is a widely used technique for the coverage of skin defects that cannot be closed primarily or are not suitable for skin flaps. STSG is used not only by plastic surgeons but also by the other surgical specialists such as the orthopedic, general surgeons, and otorhinolaryngologists.

The intervention of the donor site is not trivial. Sometimes patients experience more pain in donor areas rather than in recipient. Hence, patients are subject to various unnecessary medications either to relieve pain or to facilitate donor site healing.

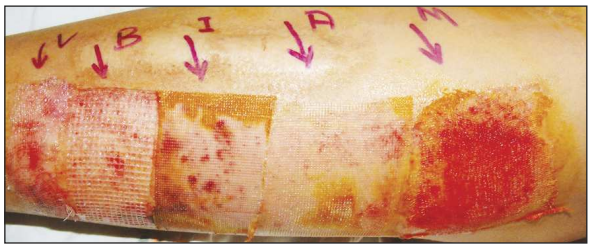
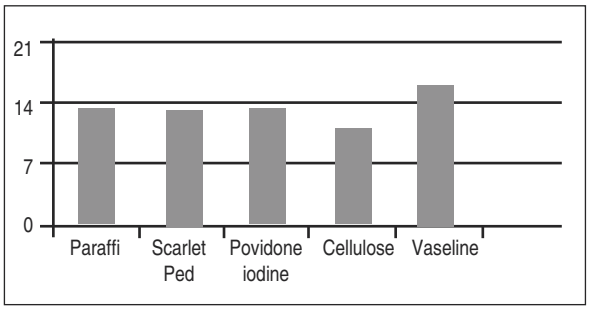
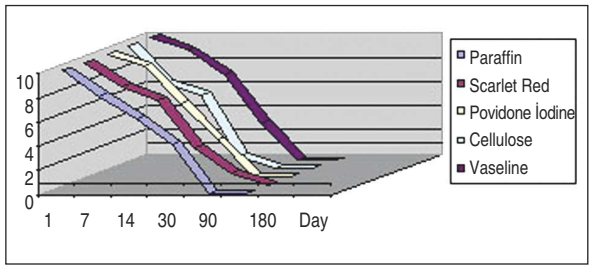


FIGURE 1: The application of the dressings on the STSG donor site. V: Vaseline, B: Paraffin, I: Povidone iodine, A: Cellulose, M: Scarlet red.



GRAPHIC 1: Mean reepithelization time in days.

FIGURE 2: Postoperative 1 year image showing a better cosmetic healing on the cellulose area.



GRAPHIC 2: Pain scale.

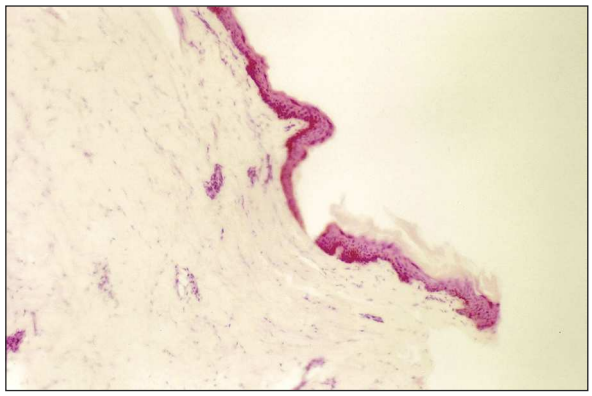


FIGURE 3: Biopsy material showing normal skin type.

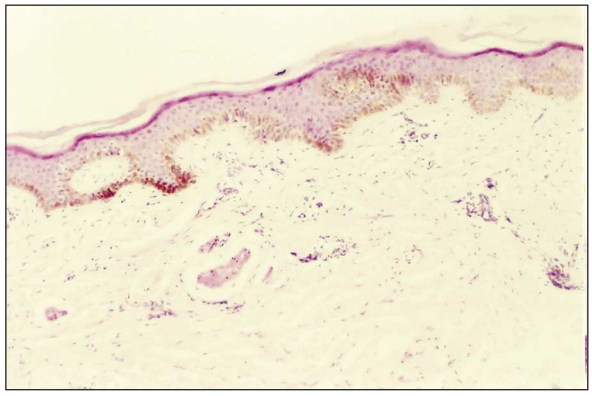


FIGURE 4: Specimen showing epidermal thickness, and the inflammation in the vaseline group.

We aimed to determine which of the following dressings could be used for the donor site assessing the patient comfort, postoperative views, and the histopathological examination by applying different type of dressings immediately after graft harvesting. Each dressing has its own advantages with regard to disadvantages. To reveal the best result, some definitive targets like minimum donor site trace, pain, and cosmetically the best healing were considered. Up to date, there is not a kind of study assessing these

dressing materials concurrently as donor site dressings.

MATERIAL AND METHODS

This study was carried out with the permission of the Human Research Review Committee of the Hospital. Volunteering patients were asked to sign the informed consent for this study before entry.

STSGs of 0.018 inches (0.045 cm) were harvested by the same surgeon using Padgett dermatome (Integra, NJ, USA). Mostly, buttocks and the thigh regions were preferred. Twelve patients, with a mean age of 28 (15-48) were included in the study. Male to female ratio was 11 to 7.

Five different types of dressings were chosen for the donor sites including povidone iodine, vaseline, paraffin, scarlet red, and cellulose.

After graft harvesting, the dressings were immediately applied on donor sites vertically divided into 5 equal imaginary areas with each dressing placed on one randomly selected area (Figure 1). None of the STSG dressings were removed; thus, spontaneous separation of the dressings had occurred on the forthcoming days.

Postoperative pain and patient discomfort were assessed daily by questioning the patient via a pain scale rating from 1 (least pain and most comfort) to 10 (most pain and discomfort). Epithelialization rate in time was evaluated by inspection and by getting the incisional biopsies after the re-epithelialization had finished entirely. The donor site was photographed every week in the first month then every month till the end of the first year.

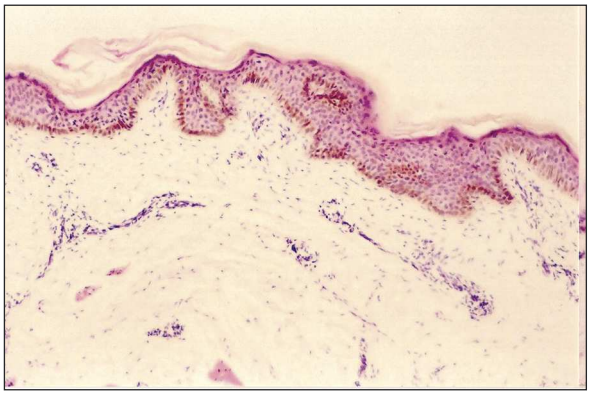


FIGURE 5: Paraffin causes more vascularity and inflammation.

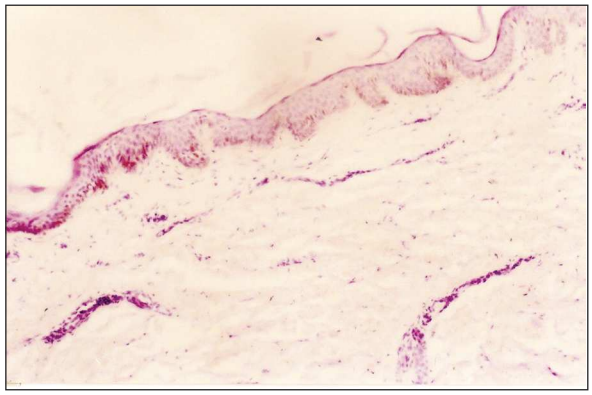


FIGURE 6: Please note povidone iodine group resembles the other groups in epidermal thickness and fibrosis, where vascularity is seen clearly.

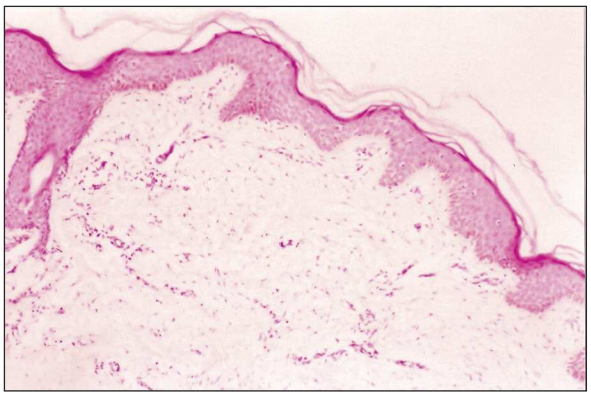


FIGURE 7: Cellulose depicting better results such as less inflammation, and vascularity. Note epidermal thickness is less than the others.

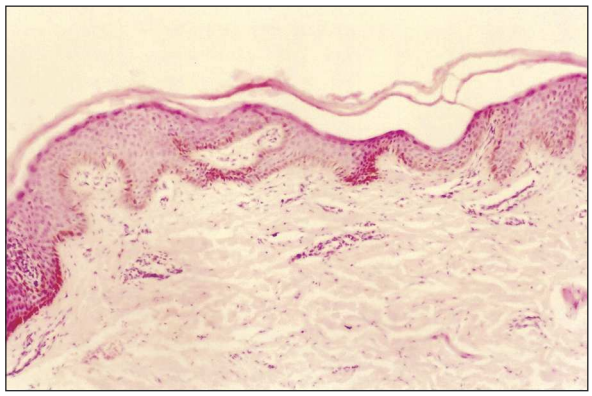


FIGURE 8: Scarlet red causes epidermal thickness, vascularity, and inflammation more.

All biopsy specimens were examined by the same pathologist. Hematoxylene-eosin stain was used. Epidermal thickness, the degree of fibrosis, inflammation, and the vascularity were critically assessed.

Wounds with no residual exudates and no pain when exposed to air were considered complete re-epithelization.

The ultimate aim was minimum donor site trace, pain, and best cosmetic healing.

ANOVA with the variables listed in Graphic 1 was used for statistical analyses.

RESULTS

HEALING

The mean donor site was 160 cm^2. The size of the donor site did not influence healing.

No postoperative complications were observed interfering with complete healing.

Mean re-epithelization time is shown in Graphic 1. While the highest rate of epithelization was in the cellulose group (mean 10.9 days), it was 13.4 days for paraffin, 13.1 days for scarlet red, 13.5 days for povidone iodine, and 16 days for vaseline. This difference was not statistically significant.

The photographs on days 7, 14, 30, and months 6, and 12, suggest that the quality of epithelization is higher in the cellulose group (Figure 2).

PAIN AND DISCOMFORT

The pain and the comfort of the patient were assessed with the epithelialization time for the same occasion. When the dressings spontaneously seperated, the pain itself dissolved which rose up the comfort of the patient.

The major discomfort for the patients was attachment of their dressings to the surround, which terminated with the spontaneous separation of the dressing.

Graphic 2 indicates that the highest pain scores are in the vaseline group and the lowest in the cellulose group at any time point. This time dependent result shows significant difference in pain scores when the cellulose group is compared with the others.

TABLE 1: A simple classification organized by Feldman DL.[1,2]

Dressings
Open
No dressing
Semi open
Fine mesh gauze
Scarlet red
Vaseline gauze
Xeroform
Biobrane
Occlusive
Duoderm
Semi occlusive
SAM dressings
Op-Site
Tegaderm
Biological dressings
Autograft
Excess skin graft
Homograft
Human cadaver skin
Xenograft
Porcine
Amniotic membrane

Cellulose dressings ensured lowest pain and highest patient comfort.

BIOPSIES

The histopathological examination revealed no significant difference between groups (Figure 3-8). All donor sites healed with almost identical pathological quality. Figure 3 identifies normal skin biopsy while figure 7 shows the cellulose treated donor site.

CONCLUSION

STSG remains the central strategy of burn wound management. STSG is used not only by plastic surgeons but also by the other surgical specialists such as the orthopaedic, general surgeons, and otorhinolaryngologists.[1]

Treatment of STSG donor sites has been an ongoing focus of dressing comparison studies. Surgeons using STSGs regularly struggle with the different dressing options. An ideal dressing method should provide low infection rate, heal fast,

cause little pain to the patient, need minimal post-operative care and be inexpensive. Yet, no ideal method for the appropriate dressing is present currently. Studies are underway to welcome the best choice for the STSG donor sites.

Feldman et al categorized STSG dressings into the following 4 groups: open, semi open, occlusive, and semi occlusive.[2] After that, an additional group, biological dressing, was added as located in Table 1.

For years, numerous techniques were tried to heal the STSG donor sites with highest convenience. Wood et al reported challenging donor site management options.[3] In a commendable study, Alvarez et al showed that re-epithelialization and the collagen synthesis were increased in the wounds treated with occlusive dressing.[4] Paraffin gauze, polyurethane film, polyurethane foam, and polyethane film were compared in a study held by Persson et al They showed polyurethane film to cause less pain and discomfort, and also the easiest to remove.[5] Disa et al evaluated combined calcium sodium alginate and bio-occlusive membrane dressing in the management of STSG donor sites.[6] Kilinc et al scored the healing times and the pain to assess the problem more objectively.[7] Another study by Misirlioglu et al suggests the use of honey with a well-known benefit for various types of wounds, as an adjunct in the healing of STSG donor sites.[8] An unexpected finding came from Malpass et al reporting the superiority of Xeroform over Jelonet dressing for STSG donor sites.[9] Finally, Feldman, summarized the issue with the article suggesting the preferences for the management.[1]

We investigated the effects of five dressings in twelve patients on the donor sites of STSGs.

The major endpoints of the study were minimum donor site trace, pain, and best cosmetic healing. Thus, five different dressings were used with characteristics discussed below.

Inadine® (povidone iodine plus polyethylene glycol: Inadine consists of a knitted viscose fabric impregnated with a polyethylene glycol base containing 10% povidone-iodine, equivalent to 1.0% available iodine. It may be categorized in the semi occlusive group. In the presence of wound fluid, povidone-iodine, a potent antimicrobial agent with a broad spectrum of activity, is readily released from the PEG base. The dressing is designed as a low adherent wound contact material. Unlike paraffin or lanolin, Inadine is water-soluble and easily removed from the skin or wound surface. Inadine is for topical use only. Monitoring serum iodide levels and thyroid function tests are advisable in patients using Inadine.

Vaseline Gauze: It has been used as a semi open dressing for years.

Scarlet red: It designated scarlet due to two main antibiotics in its content giving the mesh a red color.

Adaptic® (cellulose plus petrolate): Adaptic consists of knitted cellulose coated with petrolate. Adaptic is uniform and porous in structure, is non-adherent, can be cut or trimmed to wound size without unraveling or shredding. Impregnation with petrolatum emulsion is designed to help protect the wound. Adaptic can be used for any draining wound.

Bactigrass® (paraffin): Bactigrass consists of a cotton leno-weave fabric, impregnated with soft paraffin, containing 0.5% w/w chlorhexidine acetate. Chlorhexidine is an antimicrobial agent that is active against a wide range of microorganisms. Bactigras is used as a wound dressing for the prevention of infection in minor skin loss injuries and ulcerative wounds.

Yet, no ideal method was shown for the split-thickness donor site dressings. Under these circumstances, the practitioner should consider the use of alternative dressing methods for better cosmetic results. New researches and technologies will allow highly preferable new dressing materials in the market.

Hence, we suggest that cellulose coated with petrolatum is a good alternative in STSG donor sites regarding cost-effectiveness. We highly recommend the use of this material for better cosmetic results, even in larger areas, to reduce pain and increase the comfort for any patient, especially in elders.

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