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Original Article

Clinical observation of Wound Care Ointment on split-thickness skin graft donor site healing

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Abstract: Objective: This study aimed to investigate the clinical application of Wound Care Ointment combined with Vaseline gauze for the repair of split-thickness skin graft donor sites. Methods: A total of 64 patients who met the inclusion criteria were included. The study group (32 patients) used Vaseline gauze lined with Wound Care Ointment to close the split - thickness skin graft donor sites, while Vaseline gauze was applied directly to the donor sites in the control group (32 patients). Demographic data, wound infection conditions, epithelialization time, the time of the first postoperative outer gauze replacement, Visual analogue scale (VAS) during the first postoperative outer gauze change and the number of layers of bleeding gauze were recorded for the selected patients. Results: The epithelialization time of the donor site wound in the study group was significantly shorter than that in the control group [(10.09±0.93) days vs. (10.78±0.94) days, P<0.05]; VAS for the first postoperative change of the outer gauze in the study group was lower than that in the control group (2.47±0.84 vs. 3.53±1.14, P<0.05); the time for the first postoperative change of the outer gauze in the study group was later than that in the control group [(6.38±0.91) days vs. (5.78±1.26) days, P<0.05]; and the number of layers of bleeding gauze during the first postoperative change of the outer dressing in the study group was less than that in the control group (6.72±1.02 vs. 7.50±1.08, P<0.05). Conclusion: Wound Care Ointment is beneficial for the wound healing of split-thickness skin graft donor sites, which prolongs the first postoperative dressing change, reduces pain during the removal of the inner layer dressing, provides excellent wound protection and shortens the healing time. Therefore, Wound Care Ointment can be recommended for the repair of split-thickness skin graft donor sites.

Keywords: Wound Care Ointment, split-thickness skin grafting, donor site, wound healing

Introduction

Split-thickness autografts have been widely applied to repair skin defects caused by burns and trauma [1]. Donor site complications, such as pain, infection, and leakage of blood, are also common and will slow the rate of wound healing. Currently, there is no unified treatment option for split-thickness skin graft donor sites. Selecting appropriate wound dressings and ointments is crucial for promoting healing, reducing blood loss, and alleviating patient discomfort, which significantly impacts the entire treatment process [2, 3]. Vaseline gauze can only offer physical isolation from the external environment. The hemostatic and wound - protecting effects are limited and cannot provide essential nutrients for wound repair [4, 5]. Delayed healing of split-thickness skin graft donor sites presents significant challenges, including wound infection and scar hyperplasia. These issues severely impact the aesthetic appearance, mental well-being and physical health of patients [6].

The future dressings should possess pH-sensitive, temperature-responsive, moisture-responsive, pressure-sensing, electroactive, biosensor-integrated, shape-memory and controlled drug-releasing systems [7]. Shen Z et al found that antibacterial hydrogels containing oxidized alginic acid and loaded with exosomes can

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effectively promote donor site healing [8]; Uniyal M et al discovered that hyperbaric oxygen therapy facilitates wound healing at donor sites [9]. In this study, Wound Care Ointment contains multiple components such as sodium alginate, phytosterol esters, and soybean phospholipids. It can effectively protect the wound, maintain a moist and breathable environment, promote cell proliferation, and exert antioxidant effects, thereby creating ideal conditions for donor site wound healing [10]. However, there are currently few reports on the application of Wound Care Ointment in the wound healing of split-thickness skin graft donor sites. The aim of this study was to investigate the effect of using Wound Care Ointment lined with Vaseline gauze to treat the donor sites, so as to contribute novel insights into optimizing donor site management strategies.

Materials and methods

Subjects and grouping

This prospective trial was conducted from June 1, 2024, to July 31, 2025, at the Burn and Plastic Surgery Department of the 73rd Group Army Hospital in Xiamen, China. Patients who met the inclusion criteria were included in the study. After full deliberation, the patients independently decided on a donor-site treatment method. For each case in the study group, a case from the control group with a similar diagnosis was matched. Patients in both groups had their donor sites covered with Vaseline gauze. The study group was treated with Wound Care Ointment, while the control group did not use any ointment.

All patients were informed that their hospitalization data would be used for scientific research and had signed informed consent. The study was reviewed and approved by the Medical Ethics Committee of the 73rd Army Group Hospital (Approval No. 73JYY2024166-390).

Inclusion criteria: (1) Aged from 18 to 65 years, irrespective of sex; (2) The range of the skin grafting donor site on the thighs was 40 cm^2-600 cm^2; Exclusion criteria: (1) Organ dysfunction such as renal failure, severe hepatic damage, heart disease; (2) Long-term use of oral corticosteroids and immunosuppressants; (3) Patients with incomplete medical records.

Treatment and postoperative evaluation

Study group: Surgery was performed under general or local anesthesia. The split-thickness grafting skin was harvested using an electric dermatome (Maijiede Company, China) or a pneumatic dermatome (Zimmer Company, USA) from the thighs, with thickness set at 12. Wound Care Ointment (Yangsheng Company, Registration No. 20232140002) was impregnated into a single layer of Vaseline gauze, which was then applied to the donor sites. Multiple layers of sterile gauze and bandage were placed over the Vaseline gauze. Two surgeons determined the opportunity to replace the outer gauze layer according to the patients' systemic and local conditions. The systemic condition was mainly judged by the patients' temperature, and the local condition was determined by the gauze exudation. If the patient's temperature was higher than 38.5°C, the outer sterile gauze would be removed earlier. Around the 8th postoperative day, the outer sterile gauze was removed while the original Vaseline gauze was retained to cover the donor site until the donor site achieved complete epithelialization.

Control group: Patients received the same protocol of anesthesia and surgical debridement as the study group. Donor site was covered with a single layer of Vaseline gauze, fluffy layers of conventional gauze and sterile bandage were applied.

The following data were recorded for enrolled patients: patient age, gender, causes of injury, location of wound, date of surgery, operation, area of donor sites, area of skin graft, wound infection after skin grafting, time and pain score during removal of inner layer dressing at first dressing change, wound healing time, and the exuding at first dressing change.

Diagnostic criteria

Wound infection was defined as: (1) positive bacterial culture from the wound. (2) severe pain, purulent discharge or bad odor of local wound during the dressing change [11].

VAS pain score: This method is widely used for assessing wound pain. Patients were asked to indicate their perceived pain intensity (most commonly) along a 100 - mm horizontal line,

Table 1. Evaluation indicators of donor sites in the two patient groups

	Study group (n=32)	Control group (n=32)	*P* value
Age	46.97±12.44	46.38±10.87	0.840
Skin graft donor site area (cm^2)	172.81±86.85	176.88±77.56	0.844
Postoperative epithelialization time (d)	10.09±0.93	10.78±0.94	0.005
First postoperative outer dressing change time (d)	6.38±0.91	5.78±1.26	0.035
First postoperative change of outer dressing gauze layers with blood seepage	6.72±1.02	7.50±1.08	0.004
Postoperative first outer dressing change VAS pain score	2.47±0.84	3.53±1.14	0.000
Number of postoperative donor site infections	0	0.03±1.18	0.031

VAS, Visual analogue scale pain score.

and this rating was then measured as the VAS score [12].

Wound epithelialization: Wound healing was defined as either 100% epithelialization, including small residual scabs and open areas <1 cm within an otherwise fully reepithelialized area [13].

Statistical methods

Continuous data were shown as mean ± standard deviation, the student t-test was used to compare quantitative variables. A *p*-value <0.05 was considered statistically significant. The analytical process involved entering the data into an Excel spread-sheet (Microsoft Corporation, San Francisco, CA) and utilising the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL) version 22.0.

Results

Demographics

A total of 64 patients were enrolled in the study, with 32 in the treatment group and 32 in the control group. The treatment group consisted of 22 males and 10 females, aged 21-61 years. There were 8 cases of burns, 16 cases of traumas, and 8 cases of chronic wounds in this group. The control group comprised 20 males and 12 females, aged 22-61 years. There were 7 cases of burns, 17 cases of traumas, and 8 cases of chronic wounds. No statistically significant differences were observed between the two groups in terms of age, gender, and wound conditions (P>0.05). This laid a sound foundation for the comparison between split-thickness skin graft donor sites covered with Wound Care Ointment combined with Vaseline gauze and those covered with single Vaseline gauze.

Efficacy

The treatment outcomes of split-thickness graft donor sites for both groups are presented in **Table 1**. The study group demonstrated significantly earlier epithelialization of the donor site postoperatively than the control group (P<0.05). The VAS pain score during the first outer gauze change was also lower in the study group (P<0.05). Additionally, the time for the first outer gauze change was longer in the study group than in the control group (P<0.05). The number of bleeding layers during the first outer dressing change was fewer in the study group (P<0.05).

No adverse events such as allergies or infections were observed at the donor sites in the study group. Meanwhile, one case of severe pain accompanied by odor and secretion occurred after surgery at the donor site in the control group.

Representative case

The 31-year-old patient was admitted due to multiple traumatic injuries caused by a traffic accident. On the 20th day of hospitalization, she underwent debridement and split-thickness skin grafting surgery. The donor site (approximately 230 cm^2, **Figure 1A**) was on her right thigh.

Wound Care Ointment was applied to the proximal half of the donor site, whereas none was applied to the distal half. Subsequently, Vaseline gauze was applied to the donor site, covered with multiple layers of sterile gauze, and secured with a pressure bandage (**Figure 1B**).

On postoperative day 5, the proximal donor site exhibited significantly less bleeding than the distal half during the first outer gauze change

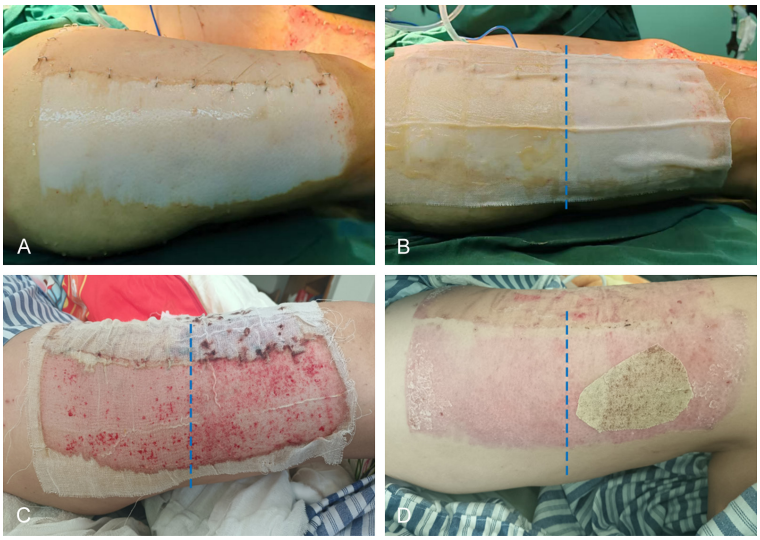

Figure 1. A. Intraoperative design of the intermediate-thickness skin graft donor site on the lateral aspect of the patient's right thigh. B. Intraoperative application of Vaseline gauze with the proximal end partially soaked in Wound Care Ointment, while the distal end remains unmedicated; the treated Vaseline gauze is then applied to cover the donor site wound. C. Wound condition on postoperative day 5. D. Epithelialized healing status of the wound on postoperative day 10.

(**Figure 1C**). On postoperative day 10, the proximal wound had completely epithelialized, healing earlier than the distal wound (**Figure 1D**).

Discussion

Skin defects caused by burns, trauma, and chronic ulcers are common problems, which pose a significant challenge in plastic and reconstructive surgery in clinical practice. Autologous skin grafting has been the standard for coverage of skin defects, but there are several postoperative donor-site complications to improve, such as bleeding, infection, scar hyperplasia and even non-healing [14, 15]. Traditional management primarily involves sealing the donor site with a single layer of Vaseline gauze, then covered with multiple layers of sterile grafting gauze and pressure bandaged. Vaseline gauze and sterile bandaging only provide isolation for the donor site from the external environment, with limited isolation and wound protective effects. Moreover, they fail to supply essential nutrients for wound repair, patients often endure severe pain during the first dressing change at the donor site, with noticeable wound exudation. Collagen hydrogel, as an innovative wound dressing, exhibits excellent biocompatibility and low immunogenicity. It provides a moist environment that is conducive to cell growth and also possesses anti - infection properties. However, issues such as its biotoxicity, loose hydrogel structure, and insufficient mechanical stability still demand further research and improvement [16, 17]. Silver ion dressings, a type of antimicrobial material containing silver ions, exhibit significant bactericidal effects. Composed of hydrophilic particles and hydrophobic polymers, they can absorb wound exudate and create a moist environment conducive to wound healing. Nevertheless, limitations such as potential wound staining and relatively single-functionality still persist [18]. Hossein Abdollahi Veshnavei found that the Agicoat dressing can be a good alternative for covering the wound of the skin donor site, which heals the wound faster and reduces pain, but it is relatively expensive [19]. Faraz Adil et al reported that the use of topical heparin can significantly reduce pain and edema, which can promote healing of the donor site wound [20]. Sheikh Sarfraz Ali et al reported that platelet-rich plasma can reduce pain and pruritus, and is suitable for improving wound healing at the skin graft donor site. However, there is a lack of large clinical studies to better understand the efficacy and complications [21]. Therefore, there is still no single agent or dressing that can efficiently mediate all aspects of the donor-site wound healing process.

This study found that the application of Wound Care Ointment to donor site wounds after split-thickness autologous skin grafting is an ideal method for donor site repair. Firstly, Wound Care Ointment contains sodium alginate, which possesses film-forming properties and can create a physical protective barrier on the donor site wound, effectively preventing external contamination. Sodium alginate rapidly forms a gel under mild conditions, providing a moist healing environment for the wound and thereby accelerating the healing process of the donor

site [22]. Secondly, phytosterol esters in Wound Care Ointment exhibit antioxidant properties, effectively scavenging hydroxyl radicals and superoxide anion radicals, thereby inhibiting excessive inflammatory responses in the early stages of the donor site wound. Phytosterol ester liposomes can be rapidly engulfed by cells upon contact, enabling efficient intracellular transport of nutrients and promoting the growth and proliferation of cells at the donor site, which surpasses traditional molecular transport methods [23, 24]. The combination of sodium alginate's film-forming properties and the antioxidant effects of phytosterol esters creates a complementary effect. Hydrogel membrane maintains a moist environment and continuously releases antioxidant components, effectively protecting the donor sites. This not only enables dynamic regulation of the wound microenvironment, but also provides dual anti-infection effects by suppressing endogenous inflammatory responses and serving as a physical barrier. Thirdly, sodium carboxymethyl starch solution is a water-soluble anionic polymer compound that exerts immunomodulatory effects on the wound microenvironment. It also possesses multiple functions, including emulsification, thickening, water retention and colloidal protection, which is widely used in clinical and basic research, such as pediatric oral mucosal repair and gastrointestinal protection [25, 26]. Applying wound care ointment to split-thickness skin graft donor sites can significantly reduce patients' discomfort during dressing changes, effectively decrease the frequency of outer gauze replacement, shorten the wound healing time, and provide effective antibacterial and hemostatic effects. However, this study also had limitations. We did not adopt a randomized double - blind design. Instead, we used a 1:1 matching enrollment method based on diagnostic similarity for grouping, which has certain shortcomings in rigor. We will aim to improve this aspect in future studies.

Conclusion

In summary, Wound Care Ointment can provide continuous and effective wound protection when applied to split-thickness skin graft donor sites, which can prolong the first postoperative dressing change, reduce pain during removal of inner layer dressing, shorten wound healing time, and protect against postoperative infection. Thus it can be recommended for the repair of split-thickness skin graft donor sites.

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Disclosure of conflict of interest

None.

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