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Case description: Complex treatment of chronic breast wounds using intermediate thickness skin grafts and supportive therapies

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ABSTRACT

Medium-thickness grafts are a prevalent treatment for a multitude of conditions, including chronic wounds, ulcers, and burn wounds. They are also widely used in reconstructive surgery. This paper describes the case of a 29-year-old female patient treated at the Clinical Department of Plastic, Reconstructive, and Burn Surgery with a chronic wound, who was qualified for a split-thickness skin graft, which was unsuccessful on the first attempt. Prior to the subsequent attempt at wound closure, the team conducts microbiological verification of the wound bed. Consequently, the wound swab culture revealed the presence of pathogens, thus confirming the necessity for targeted antibiotic therapy. This therapy was initiated with the aim of preparing the wound bed for another attempt at closure. In the operating theatre, the wound was debrided of necrotic and adipose tissue, after which a negative pressure dressing was placed. The procedure was subject to modification on a two-to-three-day basis, with the maintenance phase lasting 7 days in total, with a view to stimulating granulation. A further intermediate-thickness skin graft was applied to the prepared chronic wound bed. However, complete healing of the graft was not achieved after a period of 10 days. Then we applied a matrix dressing. This was followed by the secondary phase, which entailed wound closure. Only after such treatment was complete healing achieved. In this article, we present a multidisciplinary approach to the treatment of chronic wounds. Proper wound bed preparation is important. The intermediate thickness skin graft should be used accordingly. Microbiological examination of the wound is also helpful. Additionally, it highlights the employment of alternative supportive methods in instances of partial graft non-healing.

Keywords: graft, intermediate thickness skin graft, chronic wound, VAC therapy, collagen matrix

1. INTRODUCTION

A chronic wound is a skin defect characterized by a longer-than-average healing time, despite the use of treatment methods similar to those used for other wounds.

Chronic wound is classified as a wound that does not heal for more than 21 days. In cases of difficult-to-heal wounds, we sometimes use a medium-thickness skin graft (Ples et al., 2016). When using intermediate thickness skin, we take a layer of epidermis and a layer of subcutaneous dermis. The thickness of these layers exhibits significant variability, ranging from 0.25 mm to 0.46 mm (Kaczmarek et al., 2006). We used a dermatome to take a medium-thickness skin graft. We used special equipment to mesh the harvested graft. This process increases the graft's surface area and allowed it to cover a larger defect than the original graft. The following text is an attempt to provide a comprehensive overview of the subject matter. The mesh area is typically 1.15 times larger than the original graft, although it can be expanded up to nine times its original size. In addition, the incisions allow for the evacuation of exudate from the wound, which is essential for proper tissue healing.

The intraoperative harvesting site is covered with dressings soaked in saline solution with adrenaline and local anesthesia (Khan et al., 2022). Next, a mesh paraffin dressing with chlorhexidine and gauze soaked in a mixture of saline solution with povidone-iodine with 10% iodine content in a 1:1 ratio. The present dressing is characterized by its ability to exhibit antibacterial properties when applied to the donor site. The harvested autologous intermediate-thickness skin graft should be placed over the cleaned recipient site and secured with a mechanical stapler or skin suture. A mesh with povidone-iodine and a dressing is applied to the graft. The skin graft takes root in several stages: the imbibition phase, in which the graft is nourishes by osmosis for 24–48 hours; the inosculation phase, during which capillaries from the graft connect with those of the recipient tissue; and the revascularization phase, which involves the proper vascularization of the graft, usually occurring on the 7th–10th day after surgery. In the days following the procedure, the amount of wound exudate and the progress of graft healing are assessed. Dressings are changed every 2 days.

The team removed the direct dressing over the donor site approximately 10 days after the procedure, with only the top dressings changed every 2 days. During dressing changes, the team applies disinfectants directly to the mesh covering the donor site to prevent injuring the wound. Over time, the dressing naturally separates from the donor site (Stabryła et al., 2019).

Multiple factors can cause complications in graft healing. These include comorbidities, smoking, insufficient blood supply to the collection site, and insufficient preparation of the chronic wound bed. The success of graft acceptance can be significantly influenced by microbiological contamination. These include comorbidities, smoking, insufficient blood supply to the collection site, and inadequate preparation of the chronic wound bed. The success of graft acceptance can be significantly influenced by microbiological contamination (Khan et al., 2022).

2. CASE REPORT

A 29-year-old female patient with a non-healing wound on her chest over the breast, present for approximately two months. Physical examination revealed a significant skin defect measuring approximately 6 cm in diameter in the lower outer quadrant of the right nipple, and a defect measuring approximately 2 cm in diameter in the same area of the left nipple. We qualified the patient for surgical treatment. The chronic wound occurred after breast implant replacement surgery (Figure 1).

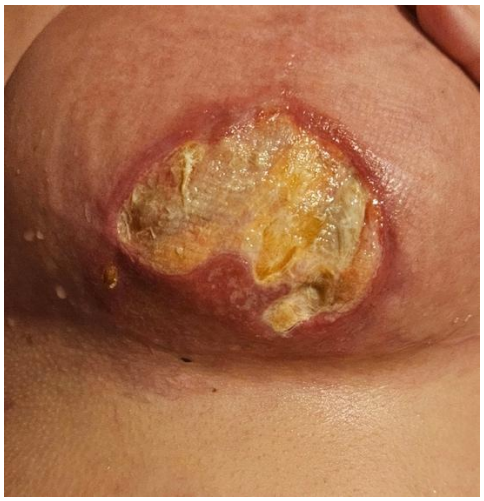

Figure 1. Chronic wound

In the first attempt to close the wound under aseptic and antiseptic conditions under general anesthesia, we surgically treated the wound by removing areas of tissue necrosis with an ultrasonic knife, while maintaining a macroscopic margin of healthy tissue. Local excessive bleeding was stopped by electrical coagulation, achieving hemostasis. The graft site was cleaned and lubricated. Using an electric dermatome, a 0.2 mm-thick graft was harvested from the lower abdomen. We chose the location for aesthetic reasons. The tissues were meshed at a 1:1.15 ratio. The prepared and meshed autologous graft was placed on the recipient site, secured with skin sutures, and covered with a sterile antibacterial dressing. We changed the dressings regularly to assess the graft healing process. Initially, the graft did not raise any concerns about surgical failure. During the scheduled follow-up examination on the fifth day after the procedure, it was observed that the graft was not healing in the expected manner. Local defects we observed. Adipose tissue was visible from the substrate. We applied conservative treatment. Regular dressing changes were performed on an outpatient basis every 2 days, with the goal of wound closure through granulation of the wound edges (Figure 2). Two months after the first procedure and ineffective conservative treatment, we qualified the patient for a repeat skin graft to replace the defect. In view of the suspected microbial contamination, as indicated by the persistent exudate and the unpleasant odour that was impeding the healing process of the wound, the medical team proceeded with the collection of a swab from the wound for the purpose of conducting a culture (Figure 3).

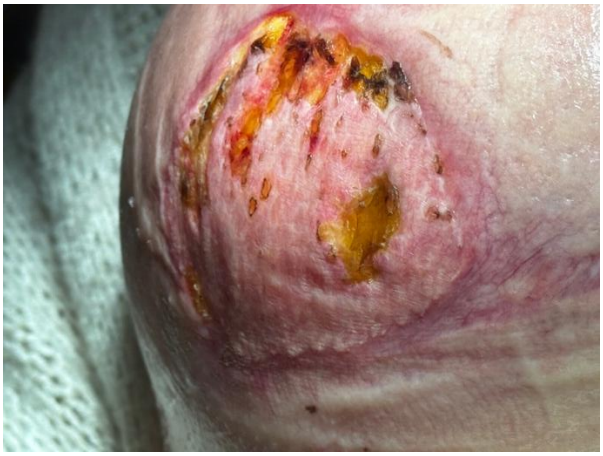

Figure 2. Partial graft failure after the first skin graft

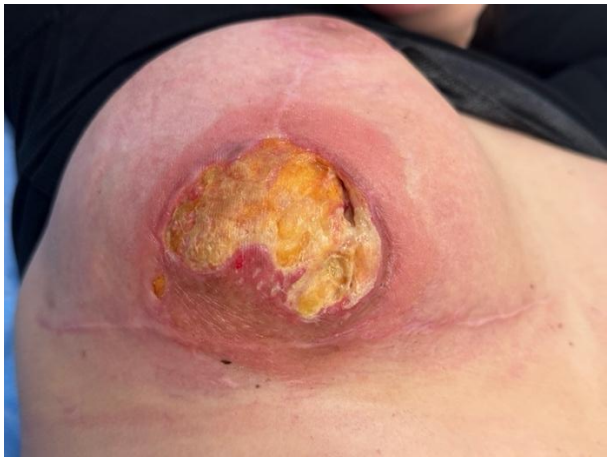

Figure 3. Wound before the second procedure

Microbiological testing revealed the presence of Pseudomonas Putida bacteria. A seven-day course of targeted oral antibiotic therapy at the maximum possible dose is administered. The wound was then surgically prepared to prepare the site for the graft. The team prepared the surgical field according to the infection control team's guidelines and then performed the procedure under short-term intravenous anesthesia. The edges of the wound were scarified and cleaned of necrotic tissue and fat using a water knife. The pocket was curetted, and hemostasis ensured. To carefully prepare the site for the graft on the previously cleaned tissue, a VAC negative pressure dressing is applied to prevent the accumulation of exudate and stimulate wound granulation. We changed the negative pressure dressing every 2-3 days for 7 days. In the meantime, after completing antibiotic therapy, we took another swab from the wound for culture - no pathogens were cultured in the microbiological examination (Figure 4).

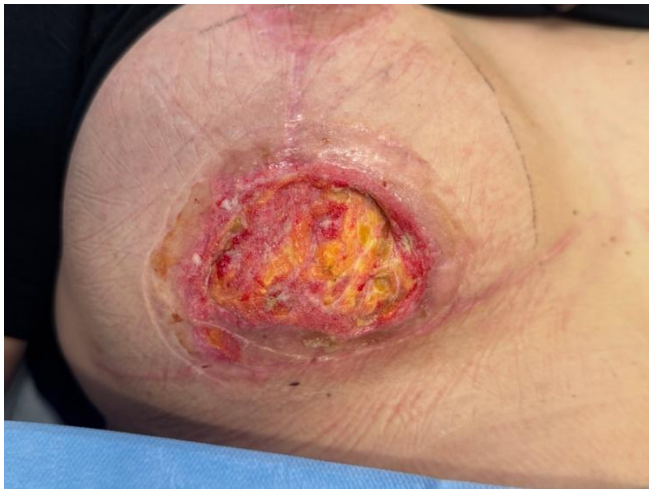

Figure 4. Clean wound bed after antibiotics and VAC therapy

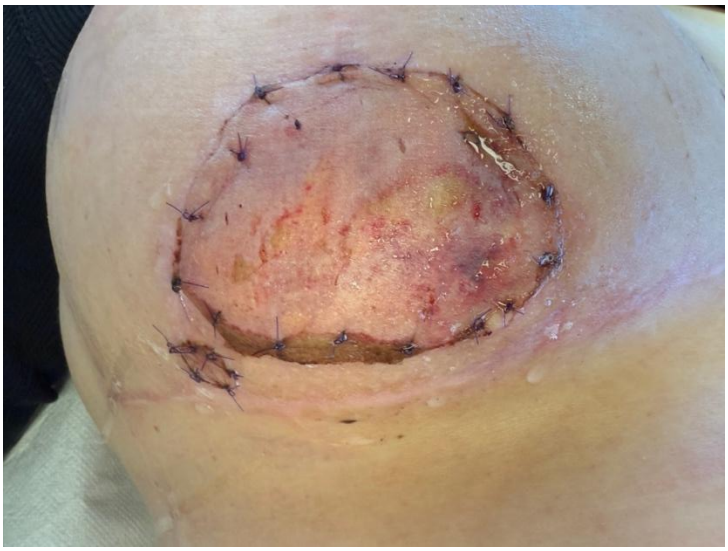

Figure 5. Post-operative view after the second graft and application of a VAC dressing

The patient was subsequently deemed eligible for a subsequent treatment of the wound with a split-thickness skin graft. The procedure was performed under short-term intravenous anesthesia. The donor site was cleaned and lubricated, and then a graft was harvested from the left lower abdomen using an electric dermatome. This time, the graft was not meshed. The graft was placed on the previously prepared bed and fixed with single sutures. Single incisions are made to relieve pressure on the graft. To seal and achieve full adhesion, we applied a VAC negative pressure dressing with a sponge dedicated to grafts to the graft in the right breast area. The negative pressure dressing we maintained for two days was set to continuous mode with a negative pressure of 75 mmHg. Subsequently, a sterile compression dressing was applied to the patient's left breast. After two days, the dressings were removed. At this point, we assessed full adhesion of the graft and the routine appearance of the healing process (Figure 5).

Ten days after the procedure, the skin graft showed signs of routine healing, with no signs of infection or local necrosis. After seven days, fat tissue appeared in the wound. The transplant in this location did not take it partially detached (Figure 6). Subsequent check-ups at 14-day intervals revealed a marked improvement, with a progressive reduction in the wound defect in this area (Figure 7).

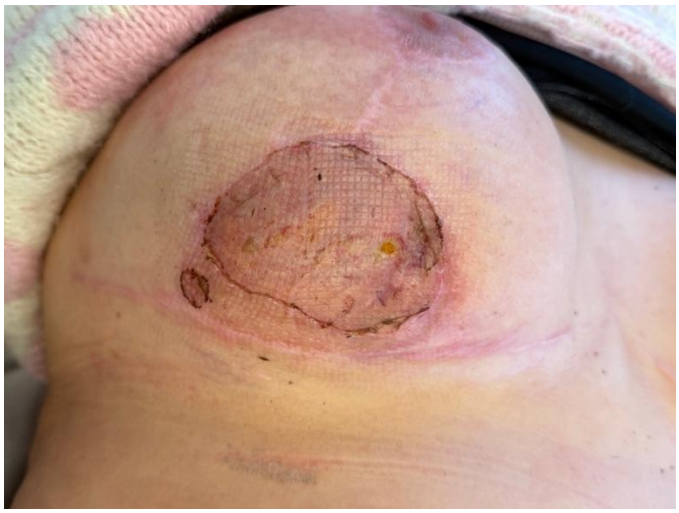

Figure 6. Partial separation of the graft after the second operation with visible fat tissue

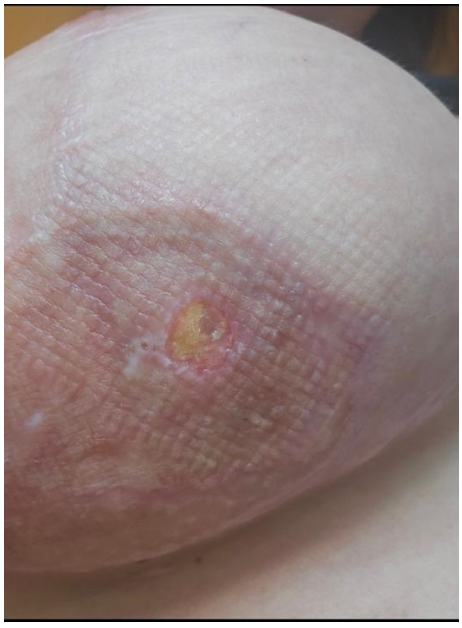

Figure 7. A significant wound was observed in the follow-up period following the second graft failure

To prevent further deterioration of the wound and optimise healing, the team made the decision to apply a collagen matrix dressing one month after the second procedure, as conservative treatment and regular dressing changes had proven insufficient (Figure 8). The matrix was kept in place for 10 days, after which we surgically treated the wound, its edges refreshed and sutured again (Figure 9).

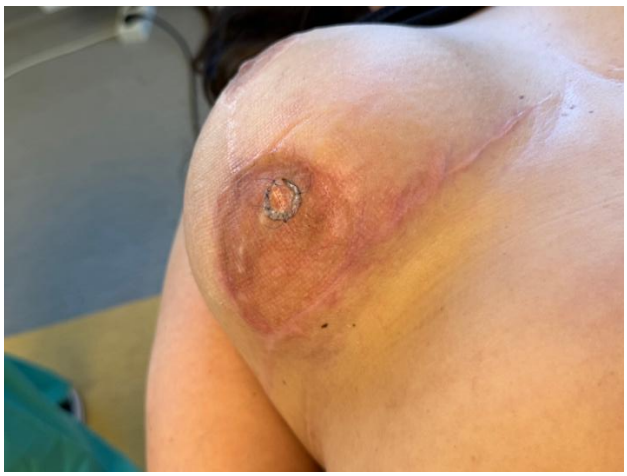

Figure 8. Wound with a collagen matrix dressing

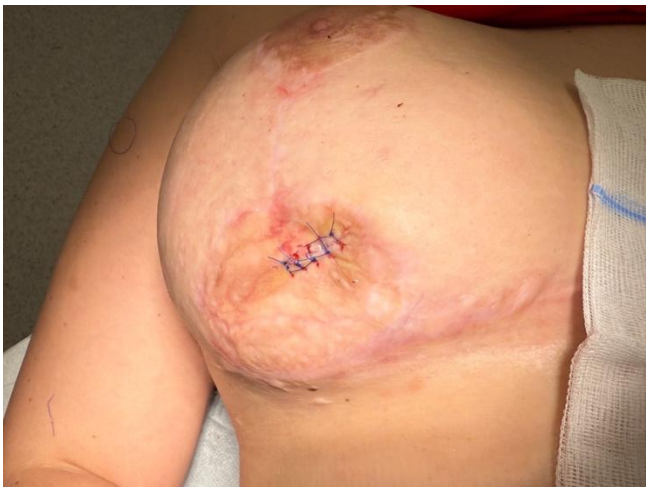

Figure 9. Secondary closure with sutures after matrix therapy

We removed stitches after 14 days. The wound healed properly. The patient's treatment was completed with therapeutic success (Figure 10).

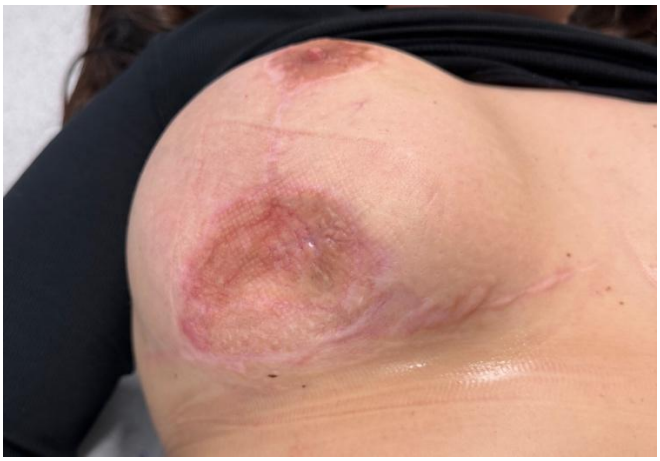

Figure 10. Healed wound

3. DISCUSSION

Skin graft restores continuity and protective function. Full-thickness skin grafts produce better cosmetic results. Intermediate-thickness grafts require less tissue for revascularization. The integration of the transplant remains a complex process, influenced by many factors (Kirsner et al., 1977; Burleson et al., 1972).

The treatment of chronic wounds and graft healing are influenced by patient comorbidities such as diabetes, heart failure, peripheral vascular disease, and malnutrition. The following text aims to provide a comprehensive overview of the topic. Healing and granulation depend on the microbiological state of the wound and the use of appropriate dressings. Blood and other fluids accumulating between the collection site and the transplant can lead to transplant rejection, so the use of vacuum dressings helps prevent this phenomenon (Khan et al., 2022; Braza et al., 2025).

The assessment of each wound should be conducted individually, with the aim of finding the simplest, fastest and most cosmetically effective solution. This approach is part of the "reconstruction ladder". Medium-thickness skin grafts are a key element of the reconstruction strategy. They can only survive on an adequately vascularized bed, but they can heal on beds that are poorer in vessels than full-thickness grafts due to the smaller volume of tissue requiring revascularization (Rose et al., 2014; Serra et al., 2017; Valencia et al., 2000). Rose et al., (2014) demonstrated that the use of intermediate-thickness grafts is an effective method of treating wounds in patients with chronic lower limb ulcers, regardless of their location and the presence of diabetes.

Intermediate-thickness grafts usually cover deep skin defects or are applied directly to muscles. Surgeons can also place them on tendons with intact connective tissue, cartilage with intact perichondrium, bone with intact periosteum, and even on vascularized biological dressings. However, if the superficial vascular layers are not present, graft healing will not be successful (Braza et al., 2025).

Serra et al., (2012) demonstrated that preoperative administration of low-molecular-weight heparin, combined with continued treatment for 12 months after surgery, can improve both early and late treatment outcomes in patients who undergo skin grafting for chronic venous leg ulcers. Despite the diligence of medical staff, complications occur during graft healing. The most common early complications—haematoma, local accumulation of serous fluid, and infections—can be prevented if clinicians administer perioperative antibiotic therapy. Late complications include hyper- or hypopigmentation, chronic erythema, and deformities caused due to excessive shrinkage of the graft.

4. CONCLUSION

Split-thickness skin grafts can be used to treat chronic wounds. Skin grafting is a procedure that requires careful care of both the donor site and the recipient wound. Thorough preparation of the donor site, combined with the use of supportive methods such as vacuum dressings, allowed for the effective restoration of skin integrity. The paper emphasizes the importance of specialized wound therapy using autogenous intermediate-thickness grafts in the treatment of skin defects caused by trauma.

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Author's Contribution

Julia Nosko, Adrianna Truszyńska-Zawisza– study design, data analysis, drafting the initial version of the manuscript.
Natalia Sioch, Julia Krotofil – data collection, statistical analysis, manuscript revision, editing.
Wojciech Jasek – scientific supervision, content consultation, final editing of the manuscript.

Informed consent

The patient consented to the publication of photographs. Written & Oral informed consent was obtained from individual participant included in the study.

Ethical approval

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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