ACHIEVING EFFICIENT WOUND CLOSURE WITH AUTOLOGOUS SKIN

Recent advancements in a wound care method that has roots running a century deep is proof that pathways to wound closure will continue to evolve.

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More than 100 years ago, Ollier performed the first reported split-thickness skin graft (STSG) containing epidermis and dermis.[1] A century later, wound closure remains the therapeutic imperative and the goal of caring for any wound.[2] Wound closure can occur in three ways: 1) primary closure by wound edge approximation with healing by first intention; 2) secondary closure by spontaneous healing with contraction and epithelialization with healing by secondary intention; and 3) tertiary closure by skin graft or flap with healing by third intention.

Surgical incisions and traumatic lacerations are closed by wound approximation. Chronic wounds and large-surface burn wounds cannot be closed by primary intention. Many advanced wound dressings, skin substitutes, and peptide growth factors have been used with varying success to help healing by secondary intention.[3] Tertiary closure by pedicled (free flaps), or by STSG fulfills the "gold standard" for wound closure; ie, closure with autologous skin.[4]

In a symposium on wound management, Tobin stated that the goal of management of all wounds is successful closure to increase function and to decrease hospital stay and disability.[5] As early as 1929 in discussing the advantages of STSG wound closure versus healing by secondary intention, Blair and Brown stated, "Early, quick, and permanent surfacing of cutaneous defects conserves health, comfort, function, time, and money; while unnecessary waiting spells economic waste."[6]

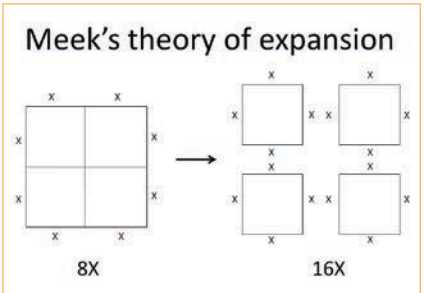

Figure 1. Micrografting Basis

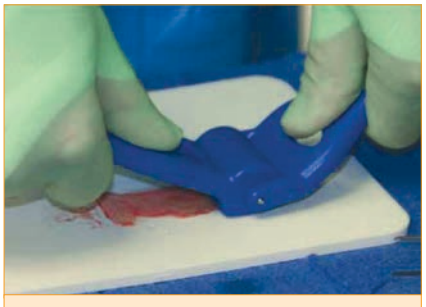

Figure 2. Graft Mining

There are many reports in the literature of STSGs being used to close chronic wounds such as diabetic foot ulcers (DFUs), venous stasis ulcers, and pressure ulcers.[4,7-10] All suggest that a successfully applied skin graft can decrease time to healing, minimize morbidity, and decrease cost of wound care. There are few carefully randomized controlled trials directly comparing the results of STSGs and standardized care with dressings leading to spontaneous healing. One such report by Mahmoud, et al demonstrated that DFUs treated with STSGs healed in 28 days versus 122 days for conservative wound care.[7]

ENHANCING STSG EFFECTIVENESS

It is clear from reviewing the experience of STSGs for chronic wound closure that the key is proper wound bed preparation prior to the STSG. All necrotic tissue must be removed from the wound. Debris, slough, bacteria, and deleterious cytokines must also be removed. Products such as hypochlorous acid* and hydroconductive dressings** have been demonstrated to be effective for wound bed preparation prior to grafting.[11-13]

Historically, STSGs have been performed in the operating room (OR) and have required sizable donor sites. To eliminate the necessity of in-hospital OR time and expense for skin grafting, a new disposable microautografting kit*** has been developed that utilizes the concept of micrografts that can be performed under local anesthesia in the outpatient wound clinic.[14] Clinically, a wound that is not progressing satisfactorily toward wound closure in a timely manner can be micrografted in the clinic using the device. Following proper wound bed preparation, a very small (postage stamp-sized) graft can be harvested with a designed dermatome preset for uniform thickness (0.012-0.016 in.). The graft is then minced in 2 perpendicular directions to yield small fragments of graft (approximately 0.8 mm sq). The STSG fragments are then spread over the wound defect. The special instruments in the kit allowing procurement and mincing of the autolo-

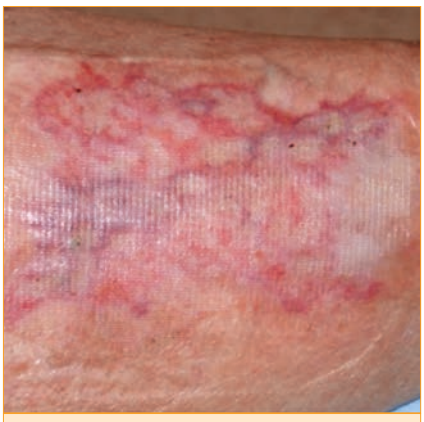

Figure 3A. Recipient Site

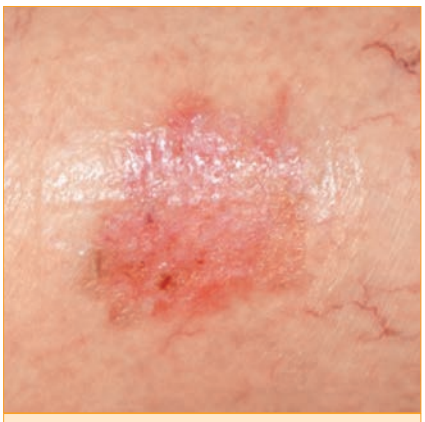

Figure 3B. Donor Site

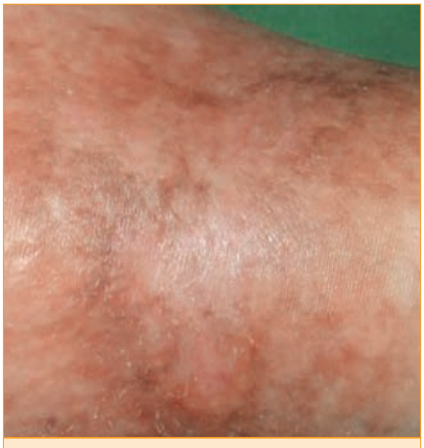

Figure 4A. Recipient Site

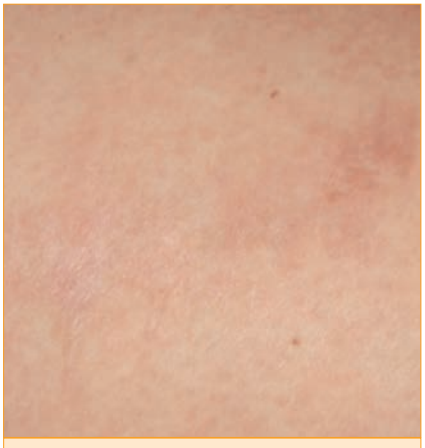

Figure 4B. Donor Site

gous skin grafts into micrografts make the device unique.

Micrografts have been reported by Boggio et al to induce faster re-epithelialization of chronic leg ulcers that had failed to heal despite good conservative local therapy.[15] They also stated that they could repair very large ulcers with small fragments of skin requiring small donor sites. In this study, researchers reported a 90% success rate with the micrografting technique.

The concept behind the micrografting is based on Meek's theory of expansion using mincing of STSGs.[16] (See **Figure 1** on page 22.) Using the disposable microautografting kit, a given STSG can be expanded 100-fold following mincing of the graft.[17] (See **Figure 2** on page 22.) Wound contraction is minimized due to the minced micrografts containing both dermis and epidermis. As can be seen in the accompanying clinical example, the prepared wound is covered with microautografts and heals with minimal scarring of both the recipient and donor sites as seen at 6 weeks. (See **Figure 3A and Figure 3B** above.) Long-term follow up demonstrates the result at 5 months. (See **Figure 4A and Figure 4B** above.)

When adequate wound bed preparation followed by application of autologous skin is conducted in the clinic, wound closure should be attainable without hospital admission, thereby conserving costs, time, and resources. ■

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★ Vashe Wound Cleanser, SteadMed Medical LLC, Fort Worth, TX

★★ Drawtex Hydroconductive Wound Dressing, SteadMed Medical LLC, Fort Worth, TX

★★★ Xpansion Micro-Autograft Kit, SteadMed Medical LLC, Fort Worth, TX

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