Split and Full-Thickness Skin Grafts for the Treatment of DFUs

These are excellent tools in a surgeon’s wound care arsenal.

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A DFU can be challenging to treat due to complicating factors including faulty biomechanics, poor glycemic control, peripheral neuropathy, smoking, increased glycosylation of soft tissue, pressure, wound bioburden, peripheral vascular disease and an impaired immune response. Foot and leg ulcerations are among the leading causes of hospitalization among diabetic patients. Additionally, one in five infected diabetic ulcers leads to amputation.

Standard wound care regimen involves routine debridement, successful treatment of infection, adequate blood supply, and off-loading. However, despite optimizing these pre-requisites for wound healing, at least 30% of the ulcers fail to heal within 20 weeks of treatment. An ulcer that has been present for 4 weeks is at a critical point in the healing process. Sheehan, et al. found that there is a 9% chance of healing an ulcer at 12 weeks when the ulcer has less than 50% area reduction at 4 weeks. The use of advanced products and grafting should be reserved for recalcitrant wounds that have stalled. Today, several options are available, ranging from cryopreserved tissue, live amniotic cells, allografts, xenografts, and autografts. Both full-thickness skin grafts (FTSGs) and split-thickness skin grafts (STSGs) are viable options.

Evidence-Based Review of Split and Full-Thickness Skin Grafts in Chronic Ulcerations

Split-thickness skin grafts (STSGs) and FTSGs offer a variety of advantages and disadvantages. Grafting options should be carefully considered prior to application. Regarding STSGs, donor site morbidity can be problematic. Inherent morbidities to the STSG donor sites include long periods of healing, pain, scar formation, and undesirable esthetics. An STSG requires more post-operative care in several circumstances. An FTSG may be a better alternative when the goal is to eliminate donor site complications.

Additionally, an FTSG offers improved esthetics, Continued on page 120
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less shrinkage, reduced post-operative pain, and reduced scar formation.\textsuperscript{13-16} Full-thickness skin grafts frequently include glabrous skin that retains a greater number of epithelial cells and thicker collagen, making it more durable and ideal for plantar DFUs.\textsuperscript{17,18}

Split-thickness skin grafts have been found to be a promising option in the treatment of difficult ulcerations.\textsuperscript{2}

In their retrospective review, the authors report a healing rate that ranged from 3 to 16 weeks with an average healing time of 5.1 weeks.\textsuperscript{19}

There is a paucity of literature that explores the effectiveness of FTSGs in the treatment of chronic foot ulcers; however, the literature that does exist is optimistic. Ramanujam, et al. published a case report involving the use of several full thickness pinch grafts harvested from the plantar forefoot to cover a plantar medial arch DFU. In their study, patients healed at an average of 6.8 weeks.\textsuperscript{20}

Lalehparvar and colleagues utilized a pinch graft harvested from the sinus tarsi for coverage of a surgical wound following excision of a cutaneous horn on the plantar foot of a non-diabetic patient. After excision, pathology reports confirmed malignancy. Their technique was successful with no recurrence.\textsuperscript{21}

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Pilot Study
The authors have completed a pilot study on the use of FSTGs used as treatment for chronic non-healing ulcerations. The FTSGs were harvested as an autograft from an amputated toe at the time of surgery. This technique allows treatment concurrent ulcerations to be addressed without the need for a more proximal amputation such as a ray resection or transmetatarsal amputation. By sparing the length, this improves function and reduces the negative biomechanical effect of the more proximal amputation. In the present pilot study, 82% of patients were reported as healed at an average of 8.4 weeks. This technique also provides the opportunity to harvest plantar skin with no risk of donor site morbidity.

Technique and Pearls
The authors always begin with the digital amputation (Figure 1a). The amputated toe is kept in warm saline while the graft site is prepared. The full-thickness graft is harvested by using a fresh scalpel. The graft is outlined by cutting the any fatty or subcutaneous tissue from the graft. The graft is then meshed using a 1:1.5 meshing plate. This allows fenestration of the graft to improve take and reduce risk of hematoma or seroma (Figure 2).

The graft is outlined by cutting the borders of the graft with a scalpel. Ideally, the graft should be taken from the plantar skin if possible. The graft is then lifted using a forceps and a larger scalpel blade such as #10 or #20. This larger blade reduces the risk of creating a “button-hole” in the graft (Figure 1b).

The maximal amount of skin should be harvested. The same scalpel blade is then used to “scrape”
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...ing is changed 5 to 7 days after the surgical procedure. The site is then hydrated with a hydrogel, and a light dressing is applied daily. Sutures are usually removed after 3 to 4 weeks.

Conclusions

DFUs remain a difficult problem for podiatric surgeons. Autografts have been shown to yield favorable results in the treatment of DFUs. Skin grafts are an excellent tool in a surgeon’s wound care arsenal. When optimized, a patient can experience healing rates that are similar to rates when biological products are used. PM

References


Autografts have been shown to yield favorable results in the treatment of DFUs.

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