Plantar Foot Donor Site as a Harvest of a Split-Thickness Skin Graft

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KEYWORDS

• Split-thickness skin graft • Diabetic foot ulcers • Plantar foot • Diabetic wounds • Diabetes mellitus

Soft tissue reconstruction of the glabrous skin on the plantar and digital surfaces in patients with diabetes mellitus can be a challenge to the reconstructive surgeon. Although, there are many treatment options available, such as local wound care, bioengineered alternative tissues, split- and full-thickness skin grafts, local random flaps, and muscle and pedicle flaps, defects of the sole or digit require soft tissue coverage that can withstand maximal pressure and shear forces encountered during ambulation.[1] When feasible, local random flaps are advantageous and are a good option for providing soft tissue coverage for these wounds. Often, wounds to the digits are not amenable to soft tissue coverage, and affected digits are likely to be amputated because of exposed deep structures like bone, tendon, or joint capsule that become easily exposed once skin breakdown occurs. Pinch grafts from the sinus tarsi, popliteal crease, or groin offer the surgeon the ability to harvest a full-thickness skin graft (FTSG) that can provide durable coverage if the graft survives. Unfortunately, in the diabetic patient with vascular compromise, these grafts are likely to fail. In addition, they create full-thickness skin defects at the donor site that require primary closure. Closure of these donor sites is easily accomplished among healthy patients but is associated with more difficulty in the diabetic population with long-standing venous insufficiency or lymphedema.

Split-thickness skin grafts (STSGs) in the diabetic foot offer many advantages.[2] STSGs are easy to perform; offer a better chance of survival as compared with

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FTSGs, especially in vascularly compromised patients; and are usually associated with little morbidity at the donor site. STSGs are cost-effective and can be repeated if needed.[1–5]

A basic principle in soft tissue reconstruction of the diabetic foot is to cover "the lost tissue" with "like tissue."[2,5–11] In general, skin varies from body site to body site. Skin from the eyelid, postauricular and supraclavicular areas, medial thigh, and upper extremity is thin, whereas skin from the back, buttocks, palms of the hands, and soles of the feet is much thicker. Plastic surgeons have found this principle useful when reconstructing glabrous soft tissue defects of the volar aspect of the hand after lengthening procedures for postburn contractures.[11]

Roukis[8] reported a novel technique of harvesting a STSG from the medial longitudinal arch of the foot to avoid donor site complications by harvesting the graft from the weight-bearing aspect of the foot. The authors have also found that this technique provides durable skin coverage almost comparable to a FTSG. Some inherent difficulties with this technique were encountered, however, particularly the ability to obtain a symmetric graft from the irregular and limited surface area of the medial longitudinal arch. Often, the harvested skin grafts would display irregular borders and were asymmetric. In addition, harvesting from this area was difficult secondary to the prominent medial band of the plantar fascia and the bone prominences of the medial column, which would limit the placement and orientation of the dermatome while harvesting the graft. For these reasons, the authors have altered this novel technique by harvesting durable plantar skin with inherent characteristics that can withstand weight-bearing forces to selected soft tissue defects and non–weight-bearing surfaces. In this article, we present a case report in which a STSG was harvested directly from the plantar aspect of the foot to cover an ulceration located on the medial aspect of the ipsilateral foot and previous partial first ray amputation. No observed complications were noted from the donor or recipient site.

SURGICAL TECHNIQUE

After patient education and medical optimization, the wound is adequately debrided and converted from a contaminated or infected wound into a clean wound. Intraoperative cultures along with clinical presentation usually determine the need and length of antibiotic therapy. A thorough vascular assessment is performed, and vascular intervention is initiated if necessary. The following are descriptions in greater depth of how the authors approach these soft tissue defects and the technique of harvesting the STSG from the plantar aspect of the foot.

The recipient bed is prepared by debriding all necrotic, infected, fibrotic, or avascular tissue. It is important to ensure that the wound bed is well vascularized and all nonviable and infected tissue has been excised before performing this procedure.[2,7,12] Granulation tissue is an indicator of skin graft readiness and survival. Absence of granulation tissue may be secondary to ischemia, contamination, or infection. If ischemia is present, further vascular imaging and intervention may be needed. Definitive soft tissue coverage should be delayed until arterial perfusion is sufficient for wound healing.

When dealing with chronic ulcers, the surgeon needs to ensure that active infection is not present. The authors recommend ulcer debridement in the operating room, wherein deep soft tissue cultures are obtained. In addition, bone cultures are taken if osteomyelitis is suspected. Once antibiotics are initiated, the wound is then clinically assessed to determine the need for staged soft tissue coverage procedures. A decision for skin grafting is based on the clinical appearance of the wound while the patient is placed on antibiotics for the infection. Deep infection