

Superficial Temporal Fascia Flap in Burn Patients: Old However Savior. A Case Report

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ABSTRACT

Deep burn wounds over hands and feet require thin and pliable flaps to cover underlying structures and to provide free range of motion. In the case reported here, we present the use of free superficial temporal fascia flap for coverage in a patient with third-degree burns on the lateral side of the left foot and ankle joint. We believe that this flap is a good alternative in patients with extensive burns where other options of thin flaps are not available or applicable.

KEY WORDS: Ankle, Deep burn, Thin flap

INTRODUCTION

Reconstruction of burn wounds can be challenging to a plastic surgeon, especially in the selection of donor sites for flap reconstruction. The main challenge is the availability and the thickness of the tissue to be transferred for better functional and cosmetic results. Extensive burns may limit options for a suitable donor site in terms of tissue components and thickness. Free flaps with thick skin components may impair the function because of their bulky size.

The superficial temporal fascia (STF) is a distinctive fascia found over the temporalis muscle. The fascia can be used as a fascia flap either pedicled or as a free flap.¹ The use of this flap was first described for posttraumatic ear reconstruction that presented difficulties for coverage.² Since then, the flap has been widely used as a free flap in the reconstruction of tissue defects of the extremities.

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ACKNOWLEDGEMENTS: The authors have not received any funding or grants in support of the presented research or for the preparation of this work and have no declarations of potential conflicts of interest.

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Burn Care and Prevention 2022/1: 34-37

In this case report, we present a young patient who required a free TPF for reconstruction of a burn wound over the lateral aspects of the ankle and foot.

CASE REPORT

A 28-year-old otherwise healthy male patient presented to our burn care unit with second-, third-, and fourth-degree burns to 30% of total body surface area as a result of an electrical burn injury. After primary survey and patient stabilization, extensive debridement was performed to remove eschar tissues in areas with third- and fourth-degree burns. After 2 sessions of debridement, we observed a tissue defect measuring 16 × 11 cm over the lateral aspect of the left ankle and foot. There was an exposure of the head of fifth metatarsal bone and the tendons of both peroneus longus and brevis muscles (Figure 1). A plan was made to cover the wound with a free STF flap.

FIGURE 1. Exposed Peroneus Tendons and Metatarsal Bone in the Tissue Defect



For the STF flap procedure, first, a horizontal incision of 3 cm in length was made over the anterior surface of left ankle. With meticulous dissection, the dorsalis pedis artery and accompanying vein were prepared as recipient vessels for free tissue transfer. Next, a T-shaped incision was made over the left temporal region starting from the preauricular region and extending superiorly 2 cm behind the superior temporal line. After the skin incision, a sharp and meticulous dissection was made over the STF, with attention made to hair follicles above and to branches of the superficial temporal artery below. A flap of 12 × 10 cm was prepared based on the superficial temporal artery and vein (Figure 2). The flap was adapted over the wound of the foot. The donor artery was anastomosed to the dorsalis pedis artery in an end-to-side manner, and the vein was anastomosed to vena comitans in an end-to-end manner using 8/0 Daylon microsutures (Doğsan) under microscope magnification (Figure 3).

After patency of the artery and vein anastomosis was confirmed with an Acland empty-refill test, a split thickness skin graft taken from right leg was applied over the fascia flap (Figure 4). The donor skin graft site was left to heal by secondary intention. A posterior short leg splint and bandage were applied, and an observation hole was made on the bandage to monitor the free flap. Postoperatively, the

FIGURE 2. Superficial Temporal Fascia Flap With Superficial Temporal Artery and Vein



leg was elevated and kept warm with an external warming device. The flap was monitored regularly every 2 hours for the first 72 hours followed by less frequent monitoring in the following days. There were no anastomotic problems in the postoperative period, and the donor site healed well.

DISCUSSION

The STF flap is an ultrathin pliable flap based on superficial temporal vessels and used mainly in coverage of tissue defects over the hand and foot.³

Deep wounds on the extremity may lead to exposure of underlying tendons or bones, which can eventually lead to tendon necrosis and osteomyelitis. Both early debridement and flap coverage are greatly important so that vital structures can be salvaged. Microsurgical tissue transfer is regarded as the workhorse method for reconstruction of deep burn wounds in the distal one-third of the leg and around the ankle joint since the availability of local tissue is limited.

In the case presented here, there was a need for coverage with a thin flap to avoid interference with the patient's ability to walk or wear shoes. There are usually multiple donor sites for thin skin flaps in the body that can be used to cover shallow burn wounds with exposed underlying

FIGURE 3. Closure of the Defect With Superficial Temporal Fascia Flap



FIGURE 4. Immediate Intraoperative View After Application of Skin Graft Over the Fascia Flap

structures. These options include the superficial circumflex iliac perforator (SCIP) flap, the anterolateral thigh (ALT) flap, and the radial forearm (RF) flap.⁴ A right SCIP flap was used earlier for coverage of deep wound on the dorsum of the right foot. Both thigh regions and the left inguinal region were extensively burned, which rendered both ALT flaps and the left SCIP flap unusable. In addition, the defect was too large to be closed with an RF flap. The depth of the defect was to the level of lateral tendons of the foot and fifth metatarsal bone. An attempt to cover the wound with a free cutaneous flap could have led to a functional limitation since any skin flap would have been thicker than the healthy skin over this region. In addition, skin flaps usually mandate a revision operation in the form of a secondary debulking surgery or liposuction for further contouring. For these reasons, the STF flap was the flap of choice for this patient. Finally, the distant donor site was far from the recipient site, allowing technical ease for 2 operative teams to work simultaneously.

Advantages of using the STF flap include its flexibility, thinness, toughness, ease of preparation with constant surgical anatomy and constant pedicle, short operation time, no need for change of position intraoperatively, and

minimal donor site morbidity with scars hidden within the hairline.¹ The ability to delineate the course of the artery by palpation is another advantage that enables the surgeon to procure the flap without the need for ultrasonic Doppler devices. These advantages make the STF flap a versatile reconstructive option in burn patients. With consideration of the unique anatomy of the temporal fascia and the adjacent tissues, different tissue layers from temporal region can be included in the flap. Hair-bearing skin island, deep temporal fascia, and temporalis muscle can be procured with this flap, depending on the need.⁵

Drawbacks of this flap are its short pedicle of 3 to 4 cm, the need for the skin graft to be applied over the flap, and the small size of the flap, with maximum flap size of 10 × 15 cm.

Although this technique was introduced about half a decade ago, we believe that this free flap has received little attention in soft tissue reconstruction of burn patients.⁶ The reason behind this is that burn patients with need for free flap transfer usually have large wounds and the STF flap can only provide small-size tissue for transfer, thus often placing this option at the end of the list of reconstructive options for many burn surgeons.

To our knowledge, there are few reports that have described the use of the free STF flap in reconstruction of lower extremity burns in the literature. Schreiber and colleagues described a case in which a free temporal fascia flap was used to cover a full-thickness chemical burn injury of the dorsum of the foot.⁷ Duteille and colleagues reported a series of 12 patients with tissue defects over the dorsum of the foot who received reconstruction with free temporal fascia flaps.⁸

One limitation of this method is the difficulty to monitor the flap clinically with the skin graft covering the fascia flap. This obstacle was overcome by the use of a hand-held Doppler device. A monitoring island of skin could have been included in the proximal part of the fascia flap for flap follow-up, as reported by Iwao and colleagues.⁹

In conclusion, a vascularized fascia flap with overlying skin graft was effectively applied in a patient who had limited thin skin flaps because of extensive burn. This flap is ideal for reconstruction of burn wounds over the hand and over the foot and ankle joint because it is the thinnest flap in the human body. The smooth areolar surface of the fascia flap makes it particularly important in providing a gliding surface in coverage of exposed tendons.

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