Using Medial Fasciocutaneous Flap to Reconstruct Tissue Defect at Achilles Tendon Area

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Summary: A 49-year-old man presented with skin necrosis and soft tissue defects at the right Achilles tendon area after tendon rupture repair. The posterior tibial artery was also damaged. We performed a reconstruction using a medial fasciocutaneous flap (and distally based pedicle). After 2 weeks, the wound healed, and the tissue defect was overcome. We found that the medial fasciocutaneous flap at the posterior leg can be raised easily and can be a simple choice to resolve tissue defects in the Achilles tendon area. This type of flap can help reconstruct tissue defects in acute wounds early. (Plast Reconstr Surg Glob Open 2021;9:e3824; doi: 10.1097/GOX.0000000000003824; Published online 17 September 2021.)

CASE REPORT
A 49-year-old man presented with no prior medical history. On February 9, 2021, his right heel was injured while playing tennis. The patient was admitted to the local hospital, where he was diagnosed with a closed ruptured Achilles tendon and was operated on with a closed ruptured repair. After 1 week, his ankle swelled significantly, and the patient was transferred to our hospital. On February 18, 2021, 2 days after admission, he had a 3 × 5 cm skin necrosis at the median area of the Achilles tendon. Ultrasound and digital subtraction angiography results displayed an interruption of the posterior tibial artery 5 cm above the medial malleolus (Fig. 1).

A second operation was done in an attempt to repair blood vessels but failed. The artery and vein were then ligated at the level of the medial malleolus. The necrotic tissue and skin were then excised. Unfortunately, a part of the skin and soft tissue defects were still present after the second procedure. On February 24, 2021, soft tissue necrosis continued to spread with a local infection. A debridement was performed during the third operation, and negative pressure wound therapy was applied. On March 18, 2021, another debridement was carried out, and part of the wound was closed (sutured, narrowed). Negative pressure wound therapy was stopped and followed by standard wound care.

On March 29, 2021, plastic surgeons were consulted regarding a skin and soft tissue defect that had formed a cavity at the medial area of the Achilles tendon. As a result, a part of the flexor digitorium longus tendon was exposed (Fig. 2). We performed a simultaneous debridement and medial posterior fasciocutaneous flap (distally based pedicle) to fill up the cavity and cover exposed tendon and skin defect.

TECHNIQUES FOR RECONSTRUCTION
A medial posterior fasciocutaneous flap (17 × 4.5 cm) with a distally based pedicle at the medial part of the leg was rotated 180 degrees. The pivot point of the flap was 10 cm above the medial malleolus. Both sides (1.5 cm each side) of the pedicle were de-epidermized, and skin (full thickness) left from both sides was used to close the donor.
Fig. 1. Digital subtraction angiogram of interruption of the posterior tibial artery above the medial malleolus.

Fig. 2. Cavity with the flexor digitorium longus tendon exposed.

site. A 2 × 3 cm distal part of the flap was de-epithelialized (remaining subcutaneous tissue and fascia) to fill up the cavity. A skin strip of 1.5 × 15 cm along the middle of the flap was kept intact (Fig. 3). A pathway was opened from the pivot point to the defect. The pedicle of the flap was buried by local skin and the strip along the flap. The skin strip helped release tension when closing the path and covering the skin defect. After 2 weeks, the defect had healed (Fig. 4).

**DISCUSSION**

The rotation flap was chosen instead of a turnover flap, like Fong, because the turnover flap needs to fold (not curve 180 degrees) the pedicle and also requires more skin graft. According to Carriquiry et al., the posterior tibial artery, located at the posteromedial leg, gives many septocutaneous branches (or perforations) at 4.5 cm, 6 cm, and 9–12 cm from the medial malleolus. These branches follow the intermuscular septum, pierce the superficial fascia, and connect to form a network to nourish the skin. Based on those anatomy characteristics, we can design many kinds of distally based pedicle flaps to cover the ankle and Achilles tendon (fasciocutaneous flaps, perforator flaps, septocutaneous flaps). The sural flap, a neurocutaneous flap, is based on blood vessels accompanied by the sural nerve and can be used like distally based pedicle flaps for the same purpose. However, the pivot point of the flap must not be lower than three fingers width from the lateral malleolus (safe area). The sural flap does not indicate if a safe area was injured. One more disadvantage of the sural flap is the loss of the sural nerve. Distally based pedicle flaps can be used as "turnover flaps" or rotation flaps.

In this case, we chose a fasciocutaneous flap because the soft tissue 5 cm from the medial malleolus is still intact. In addition, although the posterior tibial artery was ruptured, digital subtraction angiography showed many branches of rich blood network above the wound (Fig. 1). The distance from the wound to the pivot point of the flap only needed about one to two branches; so the source of blood supply for the flap was reliable. In this case, a fasciocutaneous flap was preferred over the perforator or septocutaneous vessel flaps (like propellor flaps) with only one perforator due to the richer source of blood supply. This
type of flap is also easier and quicker to raise. We chose a rotation flap instead of a turnover like Fong because a turnover flap requires folding a pedicle flap, instead of curving 180 degrees, and thus needing a larger skin graft.

We usually reserve a strip of skin at the middle of the pedicle for the following reasons: to save skin, reduce pressure and tension on the pedicle during closure, and avoid injury to the vessel network of the flap. The donor site can then be closed with little mobility, or disruption to the area (Fig. 4).

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