



Bipedicled Flap Reconstruction of Soft Tissue Defect with Achilles Tendon Exposure

Chin-Ta Lin, Chi-Yu Chen, Shun-Cheng Chang

Department of Surgery, Division of Plastic and Reconstructive Surgery, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, Republic of China

Soft tissue defects exposing the Achilles tendon are common in patients who have undergone trauma or in those with pressure ulcers associated with vascular diseases. Here, we present our recent experience of using a bipedicled fasciocutaneous flap to resurface the complex soft tissue defect and provide a gliding surface for the exposed Achilles tendon. The donor-sites were covered with split-thickness skin grafts and healed well without complications. The bipedicled fasciocutaneous flap survived completely, and the wound healed satisfactorily at 2 months follow-up. The bipedicled fasciocutaneous flap is a reliable flap for coverage of defects overlying the Achilles tendon, especially in patients with vascular problems and/or advanced age. The ease of handling, short operative time, and early recovery of mobilization function are of great benefit to patients. This method can be a valuable alternative for defect reconstructions overlying the Achilles tendon, with satisfactory results both functionally and cosmetically.

Key words: Bipedicled flap, reconstruction, soft tissue defect, Achilles tendon

INTRODUCTION

Soft tissue defects overlying the Achilles tendon are often the result of skin necrosis associated with Achilles tendon rupture or pressure ulcers, with or without wound infection. These defects represent a challenge to surgeons when encountered in reconstructive surgery, especially in elderly patients with vascular problems and those who have undergone trauma that required tendon repair, which can further compromise a poorly vascularized bed. Skin grafts often fail because of poor vascularity, an exposed Achilles tendon, and repeated mechanical irritation. Reconstructive options include the use of local cutaneous, fascial or fasciocutaneous, muscle, and free flaps.¹⁻²⁰ Although there are many different methods of surgical treatment for Achilles tendon defects, the optimal treatment remains controversial. The bipedicled fasciocutaneous flap provides adequate tissue for coverage of small to moderate sized defects, with constant vascularity, easy and quick

elevation, and acceptable donor-site morbidity.⁴ In this report, we present a case of the Achilles tendon exposure that successfully covered by a bipedicled fasciocutaneous flap.

CASE REPORT

A 40-year-old male had a traumatic rupture of his right Achilles tendon, which was surgically repaired. At the postoperation period, the wound became infected, causing dehiscence of the tendon and necrosis of the overlying tissue [Figure 1a]. After debridement, a temporary wound closure at the defect site was achieved by the vacuum-assisted closure (VAC) devices application. Infection was localized to the site of injury and pathogen was methicillin-resistant *Staphylococcus aureus*. After achieving infection control with systemic antibiotics, surgical debridement was performed. After 7 days postdebridement, the bipedicled fasciocutaneous flap was harvested. A longitudinal bipedicled flap was raised lateral to defect in the subfascial plane:

1. Flap width wider than the defect by 25%,
2. Flap length:width <2:1 with care not to injure the sural nerve.

The flap was then transposed the flap into the defect area to cover the Achilles tendon. Donor-site was skin grafted [Figure 1b]. Ankle was immobilized for 2 weeks postsurgery using a thermal protective plastic splint and cast shoes, with a posterior window for wound care. Full weight bearing was allowed approximately 4 weeks after the operation, when

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Corresponding Author: Dr. Shun-Cheng Chang, Department of Surgery, Division of Plastic and Reconstructive Surgery, Tri-Service General Hospital, National Defense Medical Center, No. 325, Sec. 2, Cheng-Gong Road, Taipei 114, Taiwan, Republic of China. Tel: +886-2-87927195; Fax: +886-2-87927194.

E-mail: aarondakimo@yahoo.com.tw

good wound healing was achieved. After 2 months, the patient recovered his Achilles tendon and was able to walk on his right foot normally [Figure 2].

DISCUSSION

Reconstruction of soft tissue defects overlying the Achilles tendon is challenging, as this area is predisposed to damage and chronic ulceration. For treating such patients, the priorities would be infection prevention, reestablishing tendon continuity, and obtaining durable soft tissue coverage. Wound healing by secondary intention, even in combination with VAC, in the ankle joint is significantly prolonged and leads to chronic, intractable wounds.⁵ Skin grafts often fail because of poor vascularization due to Achilles tendon exposure, and repeated mechanical irritation. To preserve the function of the Achilles tendon, soft tissue reconstruction must cushion the tendon and permit gliding.

With the advent of reconstructive microsurgery, the use of free flaps such as lateral arm or anterolateral thigh flap has become the treatment of choice to cover and reconstruct such defects.⁶⁻¹² However, donor-site morbidity, prolonged operation time, use of major leg vessels, and the necessity of microsurgical expertise are the trade-off of using free flaps.¹³ In addition, when using free flaps in patients with concomitant problems such as peripheral vascular disease, the incidence perioperative complications such as thrombosis of the perforating vessels, or partial or even total necrosis of the flap should be kept in mind.¹⁴

Due to their relative simplicity without the need for microsurgery, local flaps are preferred despite the associated high complication rate.^{15,16} Depending on the size of the defect, a limited number of local flaps are available for reconstruction.¹⁷⁻¹⁹ Bulky free or local flaps often destroy the anatomic shape of the region and cause persistent and long-term discomfort in patients, so that additional surgical interventions are often required. Shoes can only be worn if the transferred tissue is not too bulky. To minimize unstable

scar formation, the transferred tissue must resist the shearing forces, pressure, and friction exerted by the footwear during ambulation.^{17,20}

Perforator flaps have revolutionized the practice of modern reconstructive plastic surgery. The distal perforators in particular can be used for coverage of defects of the heel, medial malleolus, Achilles tendon, and distal two-thirds of the tibia. When a pedicled perforator flap is harvested, the perforator flap harvesting requires the dissection of vessels as small as 0.5 mm, and is frequently not completely predictable. Both for advancement flaps and for propeller flaps, where the rotations necessary to reach the recipient site can be up to 180°, the pedicle can be prone to kinking, spasm, or occlusion.²¹ Even up to 7.5% of a flap loss rate was reported in the literature.²⁰

Local flaps use tissue adjacent to the wound and regional flaps use tissue nearby in the leg based on a named or random blood supply. The indications of the local flap is to cover small defects throughout the lower leg using adjacent, undamaged soft tissue.²² Make an incision parallel to the wound and some way away from it, so as to make a flap not more than twice the length of its base, so as to make sure it has an adequate blood supply and will not necrose. The disadvantage of the bipedicled flap includes that the skin of foot region is very tight, as well as the limited rotation arc of the flap.²² Undermine the flap widely and twist it so as to distribute the tension in a wide area along the suture line. Sometimes, poor design of the flap will lead to compromise the circulation. Moreover, don't make a local flap over bone or over tendon.²² Close the secondary defect always needs a skin graft.

An alternative local flap for coverage of soft tissue defects of the Achilles region is the bipedicled fasciocutaneous flap, which has two major advantages, that is, good vascularity and minimal tension. The longitudinal incision preserves axial cutaneous perforators and parallels the orientation of the most widely used incisions for tendon repair, avoiding additional trauma.⁴ Perhaps, most important is that the procedure itself is technically straightforward; with a mean operative time of <1 h, it can easily be performed in the outpatient setting. Finally, it is associated with minimal

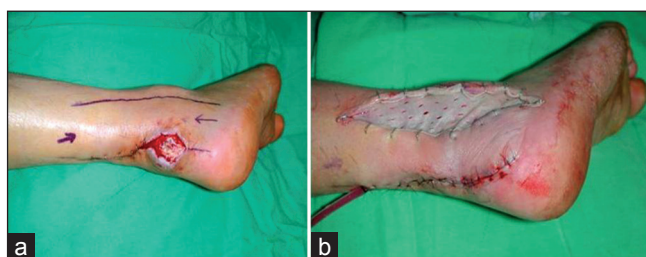


Figure 1. (a) Defect with an exposed Achilles tendon. After debridement, the bipedicled fasciocutaneous flap was designed. (b) Intraoperative view of the bipedicled fasciocutaneous flap transposed into the defect area to cover the Achilles tendon, also showing the skin grafted donor-site



Figure 2. Appearance at 2 months after functional and aesthetic reconstruction of the Achilles tendon area using a bipedicled fasciocutaneous flap

donor-site morbidity, and results are satisfying functionally and cosmetically.

CONCLUSION

To conclude, bulky free or local flaps often destroy the anatomic shape of the region and cause persistent and long-term discomfort in patients so that additional surgical interventions are often required. This management method used across a spectrum of open Achilles tendon injuries, even in patients with severe vascular diseases and infection, provided acceptable functional and esthetic outcomes. It also potentially provides an easy and simple solution to a challenge problem in a difficult area. Furthermore, it offers a convincing alternative for covering small and moderate tissue defects in the Achilles region.

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CONFLICT OF INTERESTS

None declared.

ETHICAL APPROVAL

Not required.

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