

# Vascularized extensor digitorum brevis to reconstruct the Achilles tendon

## A case report

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We have used the extensor digitorum brevis musculotendinous unit elevated on its neurovascular pedicle and transposed it to reconstruct the Achilles tendon in a case of neglected rupture.

### Case report

A 45-year-old man presented with a closed rupture of the tendo Achilles of 3 months' duration. He was unable to run or walk fast and he had a constant ache around the hindfoot. His gait lacked push-off. There was a depression just above the insertion of the tendo Achilles, and there was a palpable gap in the tendon. Thompson's test was positive.

A posteromedial slightly curved 12 cm incision exposed the Achilles tendon. The ends of the tendon had retracted and could not be brought together unless the foot was put into gross plantar flexion. The ends were smooth, yellowish-white and looked necrotic. They were resected to expose normal-appearing tendon surfaces. The proximal end was pulled distally to reduce the gap to 5 cm. It was decided to use the musculotendinous unit of the extensor digitorum brevis (EDB) to bridge the gap.

The skin incision was made on the lateral side of the tibialis anterior tendon starting at the malleoli level, going straight to the mid-third of the first metatarsal and extending laterally towards the fifth metatarsal (Landi et al. 1985, Giordano et al. 1989). A lateral skin flap was raised, and the EDB muscle was dissected off the tarsal bones from the lateral side to the medial. It was cut as proximally as possible to include its aponeurotic origin and the distal part of the extensor retinaculum. The dorsalis pedis vessels were ligated and divided just proximal to their entry into the first interosseous space. The 4 tendinous slips were cut as distally as possible. The skin incision was extended

proximally to isolate the neurovascular bundle in the lower third of the leg.

The musculotendinous unit was then tunnelled subcutaneously towards the Achilles tendon. The aponeurotic origin of the muscle was sutured to the proximal end of the ruptured tendon. Because the distal stump of the Achilles tendon was too small, the group of 4 slips of tendon was passed through a drill hole in the calcaneus just anterior to the distal stump and sutured over a button on the heel with the foot in neutral position. A few sutures were also placed between the distal stump of the Achilles tendon and the EDB tendons.

A plaster slab was applied with the knee in 30° of flexion and the foot in 10° of plantar flexion. After suture removal, an above-knee plaster cast was applied. At 4 weeks, a below-knee cast was applied. This was removed at 6 weeks, and the patient started active plantar flexion exercises. By 10 weeks, active dorsiflexion exercises were started, and by 12 weeks, the patient was allowed partial weight bearing, progressing to full weight bearing by about 4 months. He was started on tip-toe exercises to strengthen the Achilles tendon and toe-extension exercises to maintain the tone of the transferred EDB. The donor area showed marginal necrosis of the lateral skin flap which delayed wound healing. Initially there was some stiffness of the toes, but it gradually improved. At 1 year, he had 15° of dorsiflexion and 30° of plantar flexion. He was able to stand on tip-toe.

EMG showed that the muscle was well innervated—activity was recorded on extension of the toes. However, the muscle was silent during plantar flexion. Ultrasonography revealed continuity of the tendon and synchronous movement with the Achilles tendon on plantar flexion and dorsiflexion. Postoperative CT scans done at 1 1/2 years showed that the cross-section of the transposed musculotendinous unit was about the same or slightly more than the normal.

## Discussion

The use of extensor digitorum brevis as a local flap was suggested by McCraw (1979). Its clinical application as soft tissue cover for the lower leg and hindfoot was reported by Landi et al. (1985), Leitner et al. (1985) and Giordano et al. (1989). This flap consists of well-vascularized muscle tissue for coverage of exposed bone, joint or tendon. It is also expendable and causes minimal donor-site morbidity.

The conventional grafts of fascia lata, plantaris, turned-down aponeurosis of the gastrocnemius are avascular and tend to produce adhesions. The problems of wound infection and skin complications after such grafts add to the morbidity. Studies of late repairs have been inconclusive. Poor results were reported by several authors (Lindholm 1959, Lea and Smith 1972, Garden et al. 1987).

The muscular part of the EDB measures about 5 cm in length and the tendinous part 5 cm. It should thus be possible to use it for defects measuring up to 10 cm. The tendon slips are definitely smaller than the size of the tendo Achilles. Since they are vascular and innervated they should undergo hypertrophy with constant use.

We recommend this procedure for the reconstruction of the Achilles tendon in cases of neglected rupture.

## References

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