



**PERONEOUS LONGUS TENDON TRANSFER WITH POSTERIOR TIBIAL ARTERY PERFORATOR BASED PROPELLAR FLAP FOR THE SINGLE STAGE RECONSTRUCTION OF COMPOSITE DEFECT FOLLOWING RE-RUPTURE OF TENDOACHILLES.**

**Plastic Surgery**

**Dr. Bharat Rajivkumar Saxena**

MBBS, MS, M.Ch (plastic Surgery), MRCS Senior Resident – Grant Government Medical College and Sir J.J. Group of Hospitals

**Dr. Chandrakant Gharwade\***

MBBS, MS, M.Ch (plastic Surgery), Head Of Department & Asso. Professor. – Grant Government Medical College and Sir J.J. Group of Hospitals \* Corresponding Author

**Dr. Shamol Banerjee**

MBBS, MS, M.Ch (plastic Surgery)

**ABSTRACT**

Re-rupture of repaired tendo-achilles tendon is attributed to the fact that it's a zone of poor vascularity of skin, subcutaneous tissue & tendon resulting in complex problems to reconstruct in single stage. Various options are available for its reconstruction. In this article the peroneous longus tendon is transferred and used to stabilize the ankle joint along with posterior tibial artery perforator based propeller flap for soft tissue cover in same sitting. The peroneous longus tendon is preferred over other options as a good length of tendon can be obtained distally, having considerable load bearing strength, ease and safety of harvesting and transfer with good post-operative results. A local propeller flap based on Posterior tibial artery perforator is used for soft tissue cover as it is of paramount importance to provide good vascularized skin that gives good microcirculation leading to good final healing of the composite reconstruction.

**KEYWORDS**

Tendo-achilles, Peroneous longus, Tendon transfer, Perforator flap

**INTRODUCTION**

Tendo-achilles is the most commonly ruptured tendon in the human body reported by maffusi (1). Repair of long standing rupture, neglected rupture or re-rupture of tendo-achilles is an uphill task particularly if superimposed with tissue loss. Despite the magnitude of literature on this topic there is no fixed protocol towards the management. Clinically diagnosis of ruptured tendon is usually straight forward as ankle stability is lost & patient cannot balance on performing single heel rise test on affected limb without support(2,3). In fact the patient is unable to balance himself and stand only on the affected limb without support, wherein surgery would be indicated. A simple local ankle ultrasound can provide information of tendon gap and any underlying collection at the site of rupture(2). The relative zone of poor vascularity along tendo-achilles and the overlying soft tissues is deterrent to wound healing leading to dehiscence & ultimately resulting in a composite defect. This attributes to the complexity of reconstruction.

We report such a case of Single stage reconstruction of Posterior ankle composite tissue defect using peroneus longus tendon transfer along with a posterior tibial artery perforator based propeller flap for wound coverage.

**CASE REPORT**

A 35 year male patient had injury to posterior aspect of ankle with a broken glass resulting in complete cut of tendoachilles tendon. He was operated in emergency with a primary repair of tendoachilles by classic Bunnel technique. However, subsequently the overlying skin necrosed and the wound got infected, finally the exposed tendon sloughed off. Patient was treated with antibiotics and local wound care of dressings & debridement& thus resulted in a composite soft tissue defect over posterior ankle region involving 6 cm of tendoachilles tendon defect & 6\*5 cm size soft tissue defect(figure 1).

Bridging of the Tendo-achilles defect and appropriate soft tissue cover was the decided surgical endpoint & patient was taken up for definitive surgery, in prone position and under spinal anaesthesia with use of tourniquet. After necessary debridement, the final Composite defect comprised of tendoachilles defect of 8 cm, the distal tendon segment attached to the calcaneum was 2 cm with overlying skin defect of 10\*6cm. A lateral foot incision was taken to harvest the peroneous longus tendon distally. Distal cut end of peroneous longus tendon delivered in to the posterior ankle wound. It was passed obliquely through the proximal cut tendoachilles (Figure 2(A)) & with

maximum pull on both Tendoachilles & Peroneous longus providing maximum tension, a anchoring stitch was taken to both. A hole (approx. 5 mm diameter) was drilled in the calcaneum transversely about 2 cm behind the tendoachilles insertion. Then distal end of peroneous longus tendon was tunneled through the hole created in calcaneum & sutured to itself & the distal tendoachilles insertion over the calcaneum keeping maximum tension and ankle in plantar flexion of 30 degrees(figure 2(B)). The posterior tibial artery perforator based propeller flap is used to cover the soft tissue defect of posterior ankle with split skin graft to cover raw area of flap donor site. After haemostasis, a suction drain kept & flap inset was given. The ankle was immobilised using a plaster slab on extensor aspect of the limb with ankle in 20 degree plantar flexion. Post operatively patient nursed in prone position.

Initial 2 weeks, the ankle was kept flexed at 20 degree and gradually brought to neutral in another 4 weeks with changing of plasters. Patient was started on gradual ankle movements & exercise after 6 weeks of non-weight bearing period. After 8 weeks patient was advised to start his routine life gradually & slowly. Patient could do his daily activity comfortably & walk without limp at three month follow up. Good ankle stability was confirmed as patient was able to perform a single heel rise on the affected limb without any balance disturbance. Although, there was some weakness in plantar flexion as compared to the normal limb when tested actively.

**DISCUSSION**

The selection of tendon for transfer can be one of from flexor hallucis longus (FHL) (4), flexor digitorum longus (FDL) (5), peroneus brevis (PB) (6) and peroneus longus (PL), but it should be in phase with tendo-achilles and of considerable load bearing strength& also should provide extra length to pass through calcaneum & suture to itself. Therefore we use Peroneous longus, as it is simple & novel method of achieving the goals stated above. In our case FDL & FHL tendons are not preferred, as the stability of the foot as a whole is lost on contact of the full plantar surface of the foot with the ground as shown in figure 3.

Bohnsack et al (7), muscle biomechanical properties evaluation study in 2002 showed, that the peroneus longus has a higher cross-sectional area, stiffness, absorbed energy, ultimate strain and modulus of elasticity compared with the peroneus brevis therefore it is superior to peroneus brevis in biomechanical traits. Also other studies showed that tensile load of peroneus longus (1342+/-135 N) is comparable to Achilles tendon (1430+/-500N) and much stronger than peroneus

brevis (348.8+/-124.9N) (7, 8, 9, 10). Considering above studies, we decided to use peroneus longus for reconstructing tendoachilles.

Studies do show that there is a significant difference in the peak torque on eversion strength testing (4, 5, 11). However, this deficit is not appreciable clinically. Full eversion strength is not necessary for full leisure activities.

**CONCLUSION**

Long standing rupture, neglected rupture or re-rupture of tendoachilles are the conditions with multiple variables and does not have a single point solution. Relative avascularity of the ankle region, superimposed infection, lack of tissue cover and post debridement wide gap between the two ends of tendoachilles are the issues that should be consider while deciding a treatment plan. Thorough debridement and control of infection is a pre-requisite before any surgical intervention. Use of peroneus longus for tendon transfer is the preferred technique considering its length, strength, biomechanical traits, ease of transfer, safety in harvesting and excellent post-operative results. We use posterior tibial artery perforator propeller flap for skin cover at the same time.

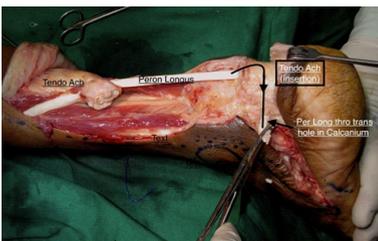
**REFERENCES**

1. Maffulli N. Rupture of the Achilles tendon. *J Bone Joint Surg Am* 81:1019–1036, 1999
2. Padanilam TG. Chronic Achilles tendon ruptures. *Foot Ankle Clin North Am* 14:711–728, 2009.
3. Maffulli N, Ajis A, Longo UG, Denaro V. Chronic rupture of tendo Achillis. *Foot Ankle Clin North Am* 12:583–596, 2007
4. Wapner KL, Pavlock GS, Hecht PJ, Naselli F, Walther R. Repair of chronic Achilles tendon rupture with flexor hallucis longus tendon transfer. *Foot Ankle*. 1993;14:443-449.
5. Mann RA, Holmes GB Jr, Seale KS, Collins DN. Chronic rupture of the Achilles tendon: a new technique of repair. *J Bone Joint Surg Am*. 1991;73:214-219.
6. Perez Teuffer A. Traumatic rupture of the Achilles tendon: reconstruction by transplant and graft using the lateral peroneus brevis. *Orthop Clin North Am*. 1974;5:89-93.
7. Bohnsack M, Surie B, Kirsch IL, Wu'cker N. Biomechanical properties of commonly used autogenous transplants in the treatment of chronic lateral ankle instability. *Foot Ankle Int*. 2002;23:661–664.
8. Finni T, Komi PV, Lummariniemi J. Achilles tendon loading during walking using a novel optic fiber technique. *Eur J Appl Physiol*. 1998;77:289–291.
9. Sebastian H, Datta B, Maffulli N, Neil M, Walsh WR. Mechanical properties of reconstructed Achilles tendon with transfer of peroneus brevis or flexor hallucis longus tendon. *J Foot Ankle Surg*. 2007;46: 424 – 428.
10. Pearsall AW, Hollis JM, Russell GV Jr, Scheer Z. A biomechanical comparison of three lower extremity tendons for ligamentous reconstruction about the knee. *Arthroscopy*. 2003;19:1091–1096.
11. Clarke HD, Kitaoka HB, Ehman RL. Peroneal tendon injuries. *Foot Ankle Int*. 1998;19:280-288.

**Figure 1 – Pre-operative defect and Markings of Posterior Tibial artery Perforator Propeller flap**



**Figure 2A – Peroneus Longus tendon tunneled through the Tendo-Achilles and Calcaneum**



**Figure 2B – Peroneus Longus sutured with adequate tension and Posterior tibial artery based propeller flap**



**Figure 3 - 3 month post operative single heel rise test**