

## MANAGEMENT OF CHRONIC ACHILLES TENDON RUPTURES BY RECONSTRUCTING WITH FLEXOR HALLUCIS LONGUS AND PERONEUS BREVIS TENDONS: A COMPARATIVE STUDY

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**ABSTRACT:** Though, The Achilles tendon is the strongest and thickest tendon in the body, it is the one which commonly ruptures. Achilles tendon ruptures are commonly seen in agricultural labour, in our country. Local steroid injections for retro calcaneal pain is one of the common risk factors. The usual Mechanism of injury is a violent dorsi flexion in a plantar flexed foot. Achilles tendon is relatively hypovascular in 3-6cms above its calcaneal insertion and repetitive micro injuries in this region is the main pathology behind the degenerative rupture of this tendon. Acute traumatic TA cuts can be managed easily but the problem is with chronic degenerative ruptures, for which various procedures were described. When the gap is less than 3cm, end to end repair with or without v-y plasty, when the gap is more than 3 cm augmentation with flexor hallucis longus and peroneus brevis tendons are popular among them. Both peronius brevis (PB) and Flexor hallucis longus (FHL) tendons are vascular and dynamic structures which helps in augmenting the healing at repair site. In our study, though AOFAS scores were slightly more encouraging for FHL, over PB, both the procedures i.e. Flexor hallucis longus and Peroneus brevis tendon transfers yielded good to excellent results in chronic ruptures of more than 4 weeks old and with more than 3cm gap.

**KEYWORDS:** Achilles tendon; rupture; Peroneus brevis tendon; Flexor hallucis longus.

**INTRODUCTION:** The Achilles tendon is the strongest and thickest tendon in the body, formed by the extension of gastrocnemius, and soleus muscles and inserts into the calcaneum. Achilles tendon ruptures are commonly seen in agricultural labour, in our country. Local steroid injections for retro calcaneal pain is one of the most important risk factor. The usual Mechanism of injury is sudden forced plantar flexion and violent dorsiflexion,<sup>1,2</sup> in a plantar flexed foot. Around 25% Achilles tendon ruptures are misdiagnosed as Ankle sprains. Achilles tendon is relatively hypovascular in 3-6cms above its calcaneal insertion and repetitive micro injuries in this region is observed to be the igniting factor. Acute traumatic ruptures can be managed easily by functional bracing in equines position, end to end tendon repairs, or by percutaneous repairs. But the problem is with chronic degenerative ruptures,for which various procedures were described. The most common among them were, reconstruction with v-y plasty, if the defect is less than 3cms, reconstruction with Peroneus brevis (PB),<sup>3,4</sup> or Flexor halucis longus (FHL)<sup>5,6</sup> tendons transfers if the defect is more than 3cms. Both peronius brevis and Flexor halucis longus tendons are vascular and dynamic structures which helps in augmenting the healing at repair site.

**MATERIALS AND METHODS:** We prospectively enrolled 20 patients with chronic tendo achilles ruptures that underwent tendoachilles reconstruction using Peroneus brevis tendon or Flexor halucis

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longus tendon, in our institute between April 2010 to April 2014. An attempt has been made to compare the functional outcome of popular tendon transfers in the management of chronic Achilles tendon rupture.

Out of 20 patients in our series, 15 were male and five were female. 85% cases were seen in the age group of 40 –50. 5 were smokers, 3 were well controlled diabetics and one was uncontrolled diabetic, in this group.

We included in our study group patients who presented after 4weeks of rupture, which is named as a chronic rupture. The mean duration was 13 weeks.

Six patients had local steroid injections.

The chief complaints were pain, calf muscle weakness, gait disturbances and gap in the tendon.

Gap was palpable in 16 cases. This gap between ruptured ends was bigger in our patients as they had delayed presentation and the habit of squatting which widened the gap. After excision of scar tissue, the defect was more than 4cms in all our cases hence reconstruction with v-y plasty was not performed, and opted to go for reconstructive procedures only.

Radiographs showed tendon calcification in 3 cases, which needed surgical excision.

Intra operatively most of the cases were found to be in Zone 2 <sup>7,8</sup> (3-6cms) according to Lagergren and Lindholm classification.

We performed peroneus brevis tendon transfer in 11 cases, and flexor hallucis longus tendon transfer in 9 cases.

**Peroneus Brevis tendon Transfer (Teuffer 's<sup>9</sup>):** Through a postrolateral longitudinal incision, Tendo Achilles and the calcaneal tuberosity were exposed. In the proximal part of the wound the sural nerve was identified and retracted. The peroneus brevis tendon was detached from its insertion through a small incision at the base of the fifth metatarsal.

The aponeurotic septum, was excised separating the lateral and posterior compartments, and the freed peroneus brevis was now delivered into the first incision. A drill hole which was large enough for the passage of the peroneus brevis tendon was made through the transverse diameter of the calcaneal tuberosity. Then the peroneus brevis tendon was passed through this hole and back proximally beside the Achilles tendon, reinforcing the site of rupture, and it was sutured to the peroneus Brevis tendon itself, producing a dynamic loop.



**Flexor Hallucis Longus Transfer {Modified Wapner's<sup>10,11</sup>}**: A longitudinal incision was made on the medial border of the foot just above the abductor hallucis muscle, extending from the head of the first metatarsal to the navicular. A sharp dissection was carried through the subcutaneous tissue to the fascia of the abductor hallucis. The abductor hallucis and the flexor hallucis brevis were reflected

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plantarward. The flexor hallucis longus and the flexor digitorum longus tendons, were identified. The flexor hallucis longus was divided as far distally as possible, just leaving an adequate distal stump, which was sufficient to suture it to FDL. A tag suture was placed into the divided proximal end of the flexor hallucis longus. The distal end of the flexor hallucis longus is sutured into the flexor digitorum longus with the toes in neutral position.

A posteromedial incision was made about 1cm medial to the Achilles tendon from its musculotendinous junction proximally to approximately 2.5cm below its calcaneal insertion. A sharp dissection was carried through the skin, subcutaneous tissues, and tendon sheath, and the tendo Achilles is exposed.

Deep fascia over the posterior compartment was incised longitudinally, and the flexor hallucis longus muscle was exposed. The flexor hallucis longus tendon was retracted from the midfoot into the posterior wound.

A tunnel was made in the calcaneum, in a supero medial to infero lateral direction, beginning at the insertion of the tendo Achilles, down to its plantar surface. FHL tendon with prolene suture tied to it, was brought out through this calcaneal tunnel, out on to the plantar aspect of the heel, and there the sutures were tied into a button which was kept till final cast removal.



Post operatively above knee long leg cast with knee in 15° flexion and ankle in 15° plantar flexion was kept for 4 weeks

After 4 weeks below knee cast was applied with foot in 15° equinus. Gradually the equinus was reduced to neutral position in further 2 weeks.

**RESULTS:** Mean follow up period in our study was 48 months (Range 6 -48months).

Results were evaluated on the basis AOFAS<sup>12</sup> scoring system.

OUT COME	AOFAS Score	FHL Transfer	PB Transfer
EXCELLENT	85-100	7	8
GOOD	70-85	1	2
FAIR	50-70	1	1
BAD	<50	0	0

We found, sural nerve neuropraxia in one case, which recovered after 6 weeks, and in 2 cases superficial skin infection which was managed with debridement and skin grafting. Delayed wound healing was noted in 3 cases. There were no cases of rerupture in our series.

**DISCUSSION:** In the management of chronic degenerative ruptures of tendo achilis, several procedures were described so far. When the gap is less than 3 cm, end to end repair with or without

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v-y plasty, when the gap is more than 3 cm augmentation with flexor hallucis longus and peroneus brevis tendons are popular among many. For any wound healing tissue vascularity is a key factor. The Achilles tendon gets its blood supply mainly from posterior tibial artery through its anterior mesotenon. The tendon is relatively hypo vascular in its length of 3 to 6 cm proximal to its site of insertion. This is the reason we find more ruptures in this area. Moreover the delayed presentations of tendon ruptures are further adding problems to the management. In our scenario the most common reasons for delayed presentations include, negligence because of poor socio economic status of the patients; attributing the present rupture to an old existing retro calcaneal pain and some cases of rupture are being misdiagnosed as ankle sprains by the attending physicians. The practice of squatting in Indian toilets further adds to the problem by increasing the gap between the ruptured ends of the tendon.

In our study both Flexor hallucis longus and Peroneus brevis tendon transfers yielded good to excellent results in chronic ruptures of more than 4weeks old, and with gap more than 3cms. The mean AOFAS scores were little better in cases with FHL tendon transfers.

Flexor hallucis longus tendon is stronger than the Peroneus brevis tendon. Its highly vascular muscle belly is an added advantage for revascularization at the repair site.

We sutured the distal stump of Flexor hallucis longus to Flexor digitorum longus tendon, to retain the plantar flexion of great toe. But, despite this measure we found some weakness in the plantar flexion of great toe. This is one disadvantage with this technique.

Peroneus brevis tendon is relatively more expendable than flexor hallucis longus tendon. Though its transfer's results in some loss of eversion, at the subtalar joint, the disability is minimal. When compared to FHL transfer procedure, PB tendon transfer is technically easy to perform.

Failure is often associated with infection. Risk factors for infection were age more than 60 years, diabetes and smoking. In general the surgical repair of Tendo Achilles poses wound problems because of its precarious blood supply.

In the present study, though AOFAS scores were slightly more encouraging for FHL, over PB, both the procedures found to be equally good.

### **BIBLIOGRAPHY:**

1. Kannus P, Józsa L. Histopathological changes preceding spontaneous rupture of a tendon. A controlled study of 891 patients. *J Bone Joint Surg Am.* 1991; 73(10): 1507–1525. [PubMed]
2. Zafar MS, Mahmood A, Maffulli N. Basic science and clinical aspects of achilles tendinopathy. *Sports Med Arthrosc.* 2009; 17(3): 190–197. [PubMed]
3. Turovj /spinella aj achilles tendon ruptures peroneus bravis tendon transfers foot and ankle 1987.7-253—259
4. Myerson achllies tendon ruptures instr. Course lecture1999,48,219-230
5. Yeoman TF, Brown MJ, Pillai A. Early post-operative results of neglected tendo-Achilles rupture reconstruction using short flexor hallucis longus tendon transfer: A prospective review. *Foot.* 2012; 24 [PubMed].
6. Mahajan RH, Dalal RB. Flexor hallucis longus tendon transfer for reconstruction of chronically ruptured Achilles tendons. *J Orthop Surg.* 2009; 17(2): 194–198. [PubMed].
7. Langergren, Lindholm vascular distribution in Achllies tendon SICOT 2010, 34, 1187-1192.
8. Popovic N, Lemaire r diagnosis and treatment of acute ruptures of Achilles tendon foot and ankle clinnam 2009 am 711-728.

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9. 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(1): 89-93(PUB MED).
10. Wapner kl, Hecht pj et al Reconstruction of neglected Achilles tendon injury ortho clinics north america 1995 26.
11. Wapner kl, Pavlock gs, et al Repair of chronic tendo achilles rupture with flexor hallucis longus tendon Foot and ankle 1993,14; 443-449.
12. Rodrgues RC; Maserio D; et al AOFAS ankle and foot scale, acta ortop bras 2008, 16-2; 107-111.

### CASE 1: (Treated with Peroneus Brevis tendon transfer)



### CASE 2: (Treated with Peronius Brevis tendon transfer).



### CASE 3: (Treated with FHL tendon transfer).



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### Case 4: (Treated with FHL tendon transfer).



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