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### A prospective study of surgical management of chronic neglected tendoachilles rupture with teuffer technique

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#### Abstract

**Aim:** Injuries of Achilles tendon are relatively common in middle aged athletes and it's one of the most common tendons to be ruptured. As Achilles tendon rupture is both a serious injury and one of the most common tendinous lesions, various treatment modalities are devised. We conducted a prospective study to analyze outcome of surgical management of chronic neglected tendoachilles rupture with Teuffer technique.

**Materials and Methods:** Our study included 20 patients of chronic neglected tendoachilles rupture. Those who visited VIMS orthopedic outpatient department were examined and included in our study once they satisfied the inclusion criteria and after thorough preoperative analysis patients were operated under spinal anaesthesia with Teuffer's technique. Post operatively patients were put on pop slab and progressive strengthening and rehabilitation program was followed. Patients were followed up at 4 weeks, 8 weeks, 3 months and at 6 months and final outcomes were measured using modified Rupp scoring.

**Results:** Final outcome were measured using modified Rupp scoring which showed 10 excellent, 4 good, 4 fair and 2 poor results.

**Conclusion:** Results of reconstruction of chronic Achilles tendon ruptures using Teuffer's technique showed the technique to be, a strong and stable repair that allows early weight bearing and ambulation, with favorable clinical results, in most patients.

**Keywords:** chronic rupture of achilles tendon, teuffer technique

#### Introduction

Achilles tendon is the largest and most powerful tendon in the ankle, formed from the fibers of two muscle units, the gastrocnemius muscle, which attaches above the knee to posterior aspect of medial and lateral femoral condyles, and the soleus muscle, which originates from the upper part of posterior tibia, fibula, and interosseous membrane. Injuries of Achilles tendon are relatively common in middle aged athletes and one of the most common tendons to be ruptured [1]. As Achilles tendon rupture is both a serious injury and one of the most common tendinous lesions, has various treatment procedures [2]. The definition of a "Chronic rupture has ranged from those diagnosed and treated more than 48 hours after injury to those diagnosed and treated up to 2 months after injury. There appears to be some consensus that a rupture diagnosed 4 to 6 weeks after injury should be considered a chronic rupture and that these are more difficult to treat than acute injuries [3]. The increase in frequency thought to be due to an increased interest and participation in recreational sports by middle aged and old aged patients [4]. The management of chronic Tendoachilles tendon rupture is usually different from that of acute rupture, as the tendon ends have retracted. The blood supply to this area is poor, and freshening of the tendon ends is necessary when they are shredded. End-to-end repair of such ruptured tendons is difficult and prone to failure, infection, and skin necrosis. Hence, even in fresh ruptures, the repair of Tendoachilles tendon should be augmented with tendon grafting, tendon transfer, or reinforcement with synthetic materials. The tendon of the flexor hallucis longus, plantaris, and peroneus brevis are used for augmentation [5, 6, 7]. Peroneus brevis tendon transfer was popularized by Perez-Teuffer.

In the original technique, the harvested peroneus brevis tendon was passed through a transosseous drill hole in the calcaneum. Subsequently, Turco and Spinella [8] modified the technique by passing the peroneus brevis tendon through the distal stump of the achilles tendon. The injury mechanism usually involves eccentric loading on a dorsiflexed ankle with the knee extended. Risk factors includes Diabetes, Long term corticosteroid intake or corticosteroid injection near tendon, Certain drugs like [9] fluoroquinolones, RA, gout, SLE, Cushing syndrome, improper footwear. We conducted a prospective study of surgical management of chronic neglected tendoachilles rupture with teuffer technique.

**Materials and Method**

It is a Prospective Study done from February 2017 to January 2018 includes 20 patients aged 30 to 60 (mean 45) years who were operated for chronic rupture of Tendoachilles with peroneus brevis tendon transfer at Department of Orthopaedics, Vijayanagar Institute of Medical Sciences, Bellary. Out of 20 patients 14 were male and 6 were female, 12 had right, 8 had left tendon rupture. 16 patient had history of local steroid injection for retrocalcaneal bursitis, 4 had sports-related injuries.

**Inclusion criteria:** includes age Group between <60 years, > 4weeks old neglected rupture, both type rupture - near tendon insertion & in watershed area, gap <5cm.

**Exclusion criteria:** are age > 60 years, Acute rupture, Associated with calcaneum fracture, gap >5cm, foot deformity, Neuromuscular deformity.

Patients presented with pain and a snapping sensation, difficulty in walking and inability to run. On examination there is local site tenderness, inability to actively plantar flex the ankle (passive plantar flexion was possible), positive Thompsons' test & O'brian's needle test, Palpable defect at rupture site. Ankle radiographs were taken to rule out calcaneal fractures. USG is done to confirm complete rupture and gap between rupture ends. All patients were operated under spinal anaesthesia after pre anesthetic evaluation.

**Surgical Procedure**

Patient placed in prone position. Expose the Achilles tendon and tuberosity of calcaneus through a posteriolateral incision; identify and retract the sural nerve in proximal part of the wound. Peroneus brevis tendon detached from separate incision at insertion. After excising aponeurotic septum, peroneus brevis brought into 1<sup>st</sup> wound. Scarred tissue of rupture ends of Tendoachilles resected. Primary tendon repair of tendoachilles was done by modified Kessler suture technique. For augmentation with peroneus brevis, Calcaneal tuberosity dissected, 4 mm hole drilled, peroneus brevis tendon passed through hole from lateral to medial, sutured proximally to peroneus brevis tendon itself along TA, producing dynamic loop.

Post operatively Patients were put in a plaster cast with the ankle in 10-15° plantar flexion and the knee in 15 degree of flexion for 4 weeks. This was followed by a below knee cast with the ankle in neutral position for another 4 weeks. Weight bearing was started 6 weeks post-operatively and cast was discontinued 8 weeks post operatively. A progressive strengthening and rehabilitation program is followed. Active exaggerated exercises, running, playing football such activities were restricted for 5-6 months depending upon age and recovery status.



Fig 1: Ruptured Achilles tendon with fibrosed ends.



Fig 2: Peroneus brevis tendon cut from its insertion end.



Fig 3: Repair of Tendoachilles with modified Kessler's method



Fig 4: Augmentation of tendoachilles tear by peroneus brevis tendon.



Fig 5: Clinical photograph at 3 weeks, shows healed scar at operative site.



Fig 6: Clinical photograph at 6 month follow up showing Dorsiflexion of foot 25°.



Fig 7: Clinical photograph at 6 months follow up.

Objective criteria (Table 1) are ankle range of motion and neurological status of the foot.

Table 1: Objective outcome of range of motion at ankle joint in operated cases.

Objective	Operated	Non Operated
Average dorsiflexion	25°	20°
Average plantar flexion	35°	30°
Nerve paresthesia	0 case	-
Inability to Eversion	0 case	-
Wound complications	1 case	-

Table 2: Subjective criteria are the Rupp score, as modified by Kerkhoffs *et al.* (Table3).

Subjective	Excellent	Good	Fair	Poor
Modified	10 cases	4 cases	4 cases	2cases
RUPP score	(50%)	(20%)	(20%)	(10%)

**Results**

All patients were examined using objective and subjective criteria.

Table 3: Modified Rupp score

Modified Rupp score	
1. Subjective satisfaction	
Excellent	5
Good	1
Satisfactory	-1
Poor	-5
2. Do you experience pain on bearing weight?	
None	5
With extended weightbearing	1
With slight weightbearing	-2
Continuous pain	-5
3. Do you experience pain independent of bearing weight?	
None	5
Pain associated with changes in weather	1
Pain sometimes associated with rest	-2
Continuous pain	-5
4. Has your ankle function decreased since the operation?	
No	+2
Reduction of muscle strength	+2
Tendency to swelling	+2
Tendency to cramp	+2
5. Do you fear rerupture?	
Yes	-1
No	1
6. Do you have limitations in your work?	
Does not apply	0
None	5
Minor	-1
Major	-3
Changed profession due to Achilles tendon problem	-5
7. Do you have limitations in sporting activities?	
Does not apply	0
None	5
Minor	-1
Major	-3
Stopped with the activity due to Achilles tendon problem	-5
Total:	
>30	Excellent
15-30	Good
5-15	Fair
<5	Poor

Results were rated as excellent (>30 points), good (15-30 points), fair (5-15 points) and poor (<5 points).

## Discussion

Treatment of a chronic neglected Tendoachilles rupture is challenging. Results of Achilles tendon repair have been variable. The Tendoachilles region, 2 to 6 cm above the calcaneal insertion has the poorest blood supply. The Tendoachilles is devoid of a true synovial sheath and has only a paratenon which is more prone to inflammation (on histological examination). In the present study, one patient had symptoms of tendinitis in the form of pain, treated with anti inflammatory drugs and prolonged immobilization for 12 weeks followed by passive and active gradual physiotherapy. There are many treatment options for Achilles tendon rupture and many have long been a matter of controversy, including closed methods, open surgical repair, percutaneous sutures, v-y lengthening of the gastrocnemius, augmented repair with central gastrosoleus aponeurosis and reconstruction using flexor hallucis longus. We performed reconstruction using peroneus brevis as torn ends of the tendons are already unhealthy. Further, the healing capacity of the injured tendon is further limited due to hypovascularity resulting in decreased tissue regeneration with a high probability of re-rupture. The use of peroneus brevis serves two advantages: it incorporates a healthy tendon with more reliable healing potential; it is an expandable tendon and there is little disability in its absence at donor site. Disadvantages of this technique: more extensive approach requires specialized surgical expertise. Infection, though rare is a possibility. Superficial infection and skin loss occurred in one patient in our study and was managed with thorough debridement and free flap, altered wound healing in the form of hypertrophic scarring can result into difficulty in shoe wearing, Use of plantaris tendon in chronic rupture is limited as it is difficult to identify among scar tissue.

## Conclusion

There is increased risk of Achilles tendon rupture after local steroid injection for inflammatory lesions of tendon or around the tendon. Results of reconstruction of Achilles tendon ruptures using peroneus brevis tendon show a strong and stable repair that allows early weight bearing ambulation with favorable clinical results in most patients. Care must be taken to prevent wound problems and deep infection that can necessitate more extensive dissection.

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