



## AUGMENTED REPAIR OF OLD NEGLECTED LOWER END TEARS OF TENDO ACHILLES WITH TEUFFER TECHNIQUE :A PROSPECTIVE STUDY

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**ABSTRACT** Repair of old traumatic or degenerated ruptures of the Tendo Achilles is a challenge. A number of techniques have been described in literature for repairing the Tendo Achilles, but with variable results. We used peroneus brevis tendon in 10 patients to augment the repair of degenerated Tendo Achilles tears by creating a dynamic loop as described by Teuffer et al<sup>2</sup>. All patients were followed up for at least 18 months. At the final follow up, 9 out of 10 patients were able to do a toe raise. 90 per cent of patients had good results using modified Rupp scoring. Advantages offered by this procedure are the use of a single small incision and use of a dispensable tendon such as the peroneus brevis without entirely depending on the damaged tendon for healing. Here, we share a prospective study highlighting augmented repair of old neglected lower end tears of Tendo Achilles with teuffer technique.

**KEYWORDS :** teuffer technique, tendoachilles tear,

### INTRODUCTION :

Acute or chronic ruptures of the Tendo Achilles cause functional deterioration of the foot and ankle<sup>1</sup>. Surgical management is needed in chronic tears where the tendon ends are thin and atrophic. The mechanism of injury usually involves eccentric loading on a dorsiflexed ankle with the knee extended<sup>4,5</sup>. Hypothyroidism, diabetes, gout, over use of steroid and flouroquinolones are risk factors for tendon rupture. Initially the treatment modality used was suturing and plaster cast but it is associated with high rates of re-ruptures. Currently, tendon grafts, a turnaround flap, tendons transfer and synthetic materials have all been used for reconstruction<sup>1</sup>. The treatment of chronic Tendo Achilles rupture differs from that of acute rupture as the blood flow to this region is low and it has no true synovial sheath. End-to-end repair of such torn tendons is difficult and is vulnerable to failure, infection, and necrosis of the skin. The use of tendon of the flexor hallucis longus, plantaris and peroneus brevis is the preferred approach. Here we are presenting a prospective study of surgical management of chronic neglected lower end of Tendo Achilles rupture with teuffer technique.

### MATERIAL AND METHOD:

This is a prospective study of management of old neglected chronic lower end ruptures of the Achilles tendon using peroneus brevis tendon in all cases *between april 2018 and dec 2020*. All patients were followed up. Patients presented within a few days due to inability to walk normally after the injury. History was typical with pain and a snapping feeling behind the ankle following a sudden jerk in sports or related activities. Patients complained of difficulty in walking and running. Clinical examination demonstrated local site tenderness, inability to actively plantarflex the ankle (passive plantarflexion was possible) and positive Thompson test<sup>1</sup>. Inclusion Criteria was age group 18-60 years, 4 weeks old neglected rupture, near tendon insertion, gap <5 cm. Exclusion criteria of the study was acute rupture, associated with calcaneum fracture, gap >5cm, foot deformity & neuromuscular deformity.

With the patient in prone position, under tourniquet a posterolateral longitudinal incision was made along the Tendo Achilles exposing the calcaneal tuberosity. The sural nerve was identified and retracted proximally in the wound. Incision was made through the Tendo Achilles sheath to expose the ruptured ends. Scar tissue was removed and the tendon exposed proximally to free it if needed. The peroneus brevis was then detached from its insertion on the fifth metatarsal following a mini incision and brought through the first incision site. Ruptured tendon ends were approximated using the modified Krackow technique with No. 2 ethibond suture. A drill hole large enough for the peroneus brevis is created through the transverse diameter of the

calcaneal tuberosity. The peroneus brevis is passed through this hole and then back proximally beside the site of rupture for reinforcement finally, it was sutured to itself to produce a dynamic loop similar to modified Teuffer technique. Patients were put in a plaster cast with the ankle in 10-15° plantarflexion 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.

All patients were followed up for assessment of integrity of repair and functional status. At each follow-up, ankle range of movements was measured by goniometer. The calf thickness was measured and compared with that of contralateral limb. The neurological status of foot, single limb hopping and strength of plantar flexors with heel raised standing, and ability to perform repeated heel raises were assessed. At the final follow-up, patient's satisfaction was assessed with Kerkhoffs' Modified Rupp Scoring system<sup>3</sup>. Results of this scoring were rated as excellent (>30 points), good (15-30 points), fair (5-15 points), and poor (<5 points).



**Fig 1A : Degenerated TA tear. Fig 1B & 1C: Identification P brevis tendon**



**Fig 1D & 1E : P brevis tendon detached from its insertion site and taken out from calcaneum after making a drill hole.**



Fig IF : After final repair

Table 1. Demographic measures.

Gender	No of pts	%
Male	6	60
Female	4	40

Table 2. Site of injury.

Site	No of pts
Left	5
Right	5

Table 3. Range of motion of ankle and foot.

Rom at	Operated site	Normal site
Ankle	DF Avg 19°	24°
	PF Avg 25°	36°
Toe raise	Sustained	8
	Present but <60 sec	2
	Unable	0
Sensory examination	Sensory hypoaesthesia	2
	Normal	8

Table 4. complication following surgery.

Complications	No of pts	%
Rupture	0	0
Infection	1	10
Hypertrophic scar	1	10
Hypoaesthesia	0	0

Table 08: 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 weight bearing	1
	With slight weight bearing	-2
	Continuous pain	-5
3. Do you experience pain independent of weight bearing.	None	5
	Pain associated with weather	1
	Pain sometimes associated with rest	-2
	Continuous pain	-5
4. Has you ankle function decreased since the operation	No	+2
	Reduction of muscle strength	+2
	Tendency of swelling	+2
	Tendency of cramp	+2
5. Do you fear re-rupture?	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 activity due to Achilles tendon problem	-5
Total	>30 15-30 5-15 <5	Excellent Good Fair Poor

**RESULT**

All patients were followed up for at least 18 months. (range, 19-48 months). one patient had a superficial postoperative infection, which was managed with debridement followed by wound closure using free flap. One patients developed hypertrophic scar and have difficulty in walking with footwear.

**DISCUSSION**

Degenerative ruptures of Tendo Achilles typically occur after 30 years of age. A triggering event may be linked to tendon atrophy as seen in weakened athletes. Studies indicate good results can be achieved using teuffer technique<sup>3</sup>. Maffulli et al<sup>8</sup> published results of a minimally invasive technique using peroneus brevis with proximal medial incision and a distal lateral incision over the Achilles tendon, leaving an intact skin bridge over area of the rupture. This technique highlights possible advantages with respect to wound healing . Long-term results using this technique demonstrated that recreational athletes could return to sports; younger competitive athletes had difficulties in activities related to eversion<sup>9</sup>.

As noted by Lagergren and Lindholm<sup>5</sup>, the Tendo Achilles region 2 to 6 cm above the calcaneal insertion has the poorest blood supply. Carr and Norris<sup>6</sup> demonstrated that the midsection of the tendon is most prone to rupture, as this is the area of the tendon in which there is a reduced percentage of blood vessels. There are many treatment choices for Achilles tendon rupture, many of which have been controversial for a long time, including closed operations, open surgery, percutaneous sutures, v-y lengthening of gastrocnemius, enhanced central gastrosoleus aponeurosis repair, and flexor hallucis longus reconstruction.

In the present study, surgical reconstruction of old neglected lower end Tendo Achilles tear was done with teuffer technique using peroneus brevis tendon was done in cases with unhealthy torn ends of the tendons<sup>4</sup>. 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 few advantages like it incorporates a healthy tendon with more reliable healing potential, it is an expendable tendon and there is little disability in its absence. In our study average dorsiflexion was 19° and average plantarflexion was 25°. Results of testing the patient's ability to toe raise for 60 seconds, 8 patients were able to sustain, while 2 patients were able to raise the toe but could not sustain it. Overall, our results were satisfactory with 85% good or excellent results as per modified Rupp criteria. Similarly, Teuffer<sup>2</sup> et al. reported that this is a dynamic loop repair technique which is biomechanically more sound than static repair. Akhil A Tiwari et al results were satisfactory within 85% good or excellent results as per modified Rupp criteria<sup>11</sup>. Krishnagiri Sundaresh et al study results are as 70% good or excellent results<sup>10</sup>. Similar augmented techniques have been published in the literature. For example, Demirel et al. noted that in combination with immediate weight-bearing ambulation, the primary repair of acute tendon achilles rupture increased with gastrosoleus turn-down flip technique results in good overall outcomes, but is correlated with similar complication rates noted above<sup>13</sup>. Disadvantages of this technique includes advanced surgical skills & infection while uncommon is a possibility. Superficial infection and skin loss occurred in one patient in our study and was treated with debridement and free flap. Altered wound healing in the form of hypertrophic scarring may lead to difficulties in wearing a shoe, the use of plantaris tendon in chronic rupture is restricted as it is difficult to distinguish between scar tissues<sup>12,13</sup>.

There is a limitation in our study that the sample size of 10 patients is too low.

**CONCLUSION**

Results of reconstruction of Achilles tendon ruptures using peroneus brevis tendon show a good and stable repair that enables early weight-bearing ambulation with favourable clinical outcomes in most patients. Disadvantages of the procedure should be shared with patients in detail before seeking informed consent. Care must be taken to avoid wound complications. Further trials involving professional athletes should be undertaken to confirm the effectiveness of this improved technique.

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