# **ORIGINAL RESEARCH**

# A prospective study of flexor hallucis longus tendon transfer for chronic Achilles tendon rupture

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#### ABSTRACT

**Background:** The Achilles tendon is the most commonly ruptured tendon in the human body. Chronic or neglected Achilles tendon ruptures are defined as those of greater than 4 weeks' duration without treatment. A number of operations have been described for the repair and augmentation of the ruptured Achilles tendon, including debridement, local tissue transfer, augmentation, and synthetic grafts. Local tissue transfer most commonly employs either the flexor hallucis longus or flexor digitorum longus tendon to treat a chronic rupture. The transfer of the flexor hallucis longus (FHL) tendon for chronic Achilles tendon disorders can both reduce pain and improve function

**Materials and Method:** This study was carried out at the Department of Orthopaedics, Navodaya Medical College, Raichur over a period of 2 years. In this study 30 patients (17 male, 13 females) with chronic tendoachilles rupture were admitted and were treated by flexor hallucis longus tendon transfer. Functional outcome was assessed as per ATR score & Leppilahti scoring.

**Results:** A total of thirty patients were evaluated in our study of which there were 17 males and 13 females. Leppilahti Scoring showed that excellent outcome found in 76.7% cases at the end of 9 months. Fair outcome found in 6.7% cases at the end of 9 months. Good outcome found in 16.7% cases at the end of 9 months.

**Conclusion:** Chronic ruptures of tendo Achilles are potentially debilitating & requires repair or reconstruction. Patients achieve almost normal maximal strength after open FHL transfer.

Key words: Chronic achilles tendon rupture, ATR score, FHL transfer, leppilahti scoring

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#### INTRODUCTION

The Achilles tendon is the strongest and largest tendon in the body, but it is also the most commonly ruptured tendon. The overall incidence of Achilles tendon rupture is on the rise recently <sup>[1, 2]</sup> because of the aging of the population, growing prevalence of obesity, and increased participation in sports <sup>[3]</sup>.

A number of operative techniques, including decompression with debridement and flexor hallucis longus (FHL) tendon augmentation, have been described for chronic Achilles tendon rupture. Chronic Achilles tendon ruptures can be treated with fascia plasty or tendon transfers. The transfer of the flexor hallucis longus (FHL) tendon for chronic Achilles tendon disorders can both reduce pain and improve function <sup>[4, 5]</sup>.

Controversy has surrounded the optimal treatment of acute Achilles tendon rupture <sup>[6]</sup>. In the past, aggressive surgical intervention was recommended over conservative management on the basis of early studies that associated conservative treatment with high rerupture rates <sup>[7, 8, 9, 10]</sup>. These studies provided a rationale for operative treatment of acute rupture of the Achilles tendon, despite the risk of complications

from surgery such as wound infection. However, recent studies have demonstrated favorable outcomes of conservative treatment using accelerated functional rehabilitation. In such studies, functional rehabilitation was more effective in reducing rerupture rates than long-term cast immobilization, and functional improvement after nonoperative treatment was comparable to that after operative repair <sup>[11, 12, 13]</sup>.

In the present study the results after FHL tendon transfer for chronic Achilles tendon rupture, with focus on function, are presented.

#### **Materials and Method**

This study of 30 patients with chronic Tendoachilles tendon rupture was conducted during the period between December 2020 to October 2022 in the Department of Orthopaedics, Navodaya Medical College Hospital and Research Centre, Raichur and were treated with Flexor hallucis longus transfer. Inclusion criteria was the interval from rupture to surgery was more than 4 weeks, Patients were not able to perform a single limb heel rise & Patients fit for surgery. Patients with Acute Achilles tendon rupture, Open injury, Patients unfit for surgery Patient not willing or couldn't come back for follow up was excluded from the study. A detailed history taken and systematic examination of the patient was conducted according to Proforma. Patients had positive Thomas

test, Matles's test & single heel raise test. Ultrasonography of Achilles tendon was done to confirm the fracture. All patients were taken for elective surgery as soon as possible after necessary investigations. Patient was kept in prone position in an operating table after spinal anaesthesia. The incision is posterior central with slight medial deviation at the calcaneal tuberosity <sup>[14]</sup>. The tendon is studied for the level of rupture, the length of distal stump and the gap in the tendon is noted. Tendon ends are freshened and mobilized. The surgery consisted of an open FHL tendon transfer to the calcaneus. A tenodesis between the distal FHL stump and the FDL was done. FHL was re-routed proximally towards the proximal stump of the resected Achilles tendon to which it was tenodesed. In this way the tendon transfer both allowed the FHL muscle and the triceps surae to act on the calcaneus. After repair of tendon the paratenon surrounding the Achilles tendon is repaired and the wound is closed in layers. Sterile dressing is applied, a short leg cast with foot in 20 degree of plantar flexion is applied & continued for minimum of 3 weeks. Between 6 and 12 weeks weight-bearing as tolerated in a walker boot was allowed. Patients were instructed at the time of discharge to review at OPD every 1 month for initial 3 months, and thereafter every 3 months for a period of 18 months. Functional outcomes were evaluated using Leppilahti score.



Fig 1: Chronic sclerosed end of Tendoachilles tendon FHL tendon isloation for augmentation



Fig 2: Shows postoperative range of movements

#### Results

We included total 30 patients of age 18-60 having chronic Achilles tendon rupture who are admitted in Navodaya Medical College Hospital and Research Centre. Majority of the patients were from 21-30 years and 51-60 years each i.e. 30% followed by 16.7% from 31-40 years, 13.3% from 41-50 years and least were from above 60 years i.e. 3.3%. 56.7% were males and 43.3% were females. Distribution according to mode of injury revealed blunt trauma in 46.7%, twist injury in 36.7% and fall in Indian closet in 16.7%. Time from injury to surgery was less than 6 weeks in 43.3% cases whereas more than 6 weeks in 56.7% cases. Distribution according to outcome-Leppilahti Scoring showed that excellent outcome found in 23.3% cases at PO 6 months and in 76.7% cases at the end of 9 months. Fair outcome found in 6.7% cases at PO 3 months, 6.7% cases at PO 6 months and in 6.7% cases at the end of 9 months. Good outcome found in 93.3% cases at PO 3 months, 70% cases at PO 6 months and in 16.7% cases at the end of 9 months. Mean ROM of plantar flexion at pre op, post-operative 3 months, 6 months and 9 months was 9.00±7.12, 31.33±8.19, 28.33±4.61 and 36.83±5.33 degrees respectively.

We observed statistically significant difference in the mean range of movements at different time intervals (p<0.05). It means ROM at plantar flexion was significantly improved at PO 9 months. Mean ROM of dorsal flexion at pre op, post-operative 3 months, 6 months and 9 months was  $18.33\pm6.48$ ,  $25.0\pm6.3$ ,  $24.33\pm6.26$  and  $27.17\pm4.49$  degrees respectively.

We observed statistically significant difference in the mean range of movements at different time intervals (p<0.05). It means ROM at dorsal flexion was significantly improved at PO 9 months. Mean ATRS at post-operative 3 months, 6 months and 9 months was  $88.27\pm5.38$ ,  $90.67\pm4.35$  and  $92.30\pm3.22$  degrees respectively. We observed statistically significant difference in the mean range of movements at different time intervals (p<0.05). It means ROM at dorsal flexion was significantly improved at PO 9 months.one patient developed wound infection during initial follow-up. One patient had ankle stiffness at the end of 9 month follow-up.

Table 1: Shows functional outcome according to ATR scoring <sup>[3]</sup>

		Ν	Mean	SD	F	Р	Inference	
ATRS	Post-Op 3 months	30	88.27	5.38		0.003 (<0.01)		
	Post-Op 6 months	30	90.67	4.35	6.36		Uighly significant	
	Post-Op 9 months	30	92.30	3.22			Fighty significant	
	Total	30	90.41	4.66				

Leppilahti Scoring	Pre-OP		<b>PO 3</b>	Months	PO 6 Months		PO 9 Months	
Excellent	0	0.0	0	0.0	7	23.3	23	76.7
Fair	0	0.0	2	6.7	2	6.7	2	6.7
Good	0	0.0	28	93.3	21	70.0	5	16.7
Poor	30	100.0	0	0.0	0	0.0	0	0.0
Total	30	100.0	30	100.0	30	100.0	30	100.0

 Table 2: Shows functional results according to Leppilahti Scoring

# Discussion

In the present study the main focus was the functional results after the transfer of the flexor hallucis longus tendon for chronic Achilles tendon rupture. 30 patients were operated on for a period of 2 years & followed up. The aim of surgical treatment in of chronic tendoachilles rupture is store full strength of the Achilles tendon and thus improve the activity level of patients. The transfer of the flexor hallucis longus tendon for chronic Achilles tendon rupture is one of the most practiced procedure for Tendoachilles rupture.

Ole Kristian Alhaug *et al.* in 2108 conducted a study that showed that Patients achieve almost normal maximal strength after open FHL transfer, but endurance is notably lower<sup>[15]</sup>.

Yeoman *et al.* treated 11 patients with chronic achilles tendon rupture using FHLtechnique & interference screw fixation, showing reliable outcomes & low complication morbidity<sup>16</sup>. Our study also shows (according to outcome-Leppilahti Scoring) excellent outcome found in 76.7% cases at the end of 9 months. Fair outcome found in 6.7% cases at the end of 9 months. Good outcome found in 16.7% cases at the end of 9 months.

# Conclusion

The operative technique described in this study is an alternative to FHL augmentation for chronic Achilles tendon rupture. Patients in this study had excellent pain relief and were satisfied with their results after surgery. The functional outcome that were found were comparable to those found with other procedures described for chronic tendoachilles rupture.

Hence, it is concluded that FHL augentation technique for chronic achilles tendon rupture and one of the effective means of treating chronic tendoachilles rupture.

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