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## Tendo Achilles reconstruction: Flexor hallucis longus tendon transfer: A case series

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### Abstract

**Introduction:** Failure of reconstruction and Wound complications following open repair for Achilles tendon ruptures remain the subject of significant debate. The aim of this study is to investigate the effects of Flexor Hallucis Longus tendon transfer to avoid complications after open repair.

**Methods:** In this case series study, open repair was performed for 6 patients with chronic tendo Achilles rupture. After the tendon was debrided, ipsilateral FHL tendon was harvested from the same incision, tendo Achilles reconstruction was done. The deep fascia and paratenon was used to cover the tendon. Anterior below knee splint applied for 6 weeks. Patients were followed for 6 months and any wound complication was recorded. During the last visit, the American Orthopedic Foot and Ankle Society (AOFAS) ankle-hind foot score was completed for all patients. Calf circumference and ankle range of motion were measured and compared with the contralateral side. Patients were asked about returning to previous activities after 6-8 weeks.

**Results:** None of the patients developed wound infection. None of the patients had any discomfort around the operation area, limitation with footwear, sural nerve injury, re-rupture, and skin adhesion. The AOFAS score averaged  $92.5 \pm 3$ . 1 patient was unable to do sports activities because of moderate pain in heavy physical exercises. The calf circumference and ankle ROM were similar between healthy and operated sides.

**Conclusion:** The present study showed that FHL tendon transfer has excellent result for chronic tendo Achilles tendon reconstruction.

**Keywords:** Achilles tendon rupture (ATR), flexor hallucis longus (FHL), The American Orthopaedics foot

### Introduction

Achilles tendon rupture (ATR) is one of the most common of tendon injuries, especially among athletes. Nonoperative treatment with splinting (Casting) is associated with good Results, but due to the lower rate of re-rupture and faster return to previous activities, surgical repair for AT rupture is preferred. The consequences of wound complications after Achilles tendon surgery are considerable and challenging. Some authors have introduced percutaneous or minimally invasive repair to decrease the incidence of these complications; however, these techniques are technically demanding, dependent on special instruments and associated with a higher risk of sural nerve injury. With regard to the limitations of minimally invasive techniques and to avoid the complications of open repair and to get the advantages of these techniques, we evaluated the wound outcomes of open ATR repair, through flexor Hallucis Longus transfer. It was hypothesized that using this new technique improves blood supply of repaired tendon and results in decreased failure and wound complications. Failure of reconstruction and Wound complications following open repair for Achilles tendon ruptures remain the subject of significant debate. The aim of this study is to investigate the effects of Flexor Hallucis Longus tendon transfer to avoid complications after open repair.

### Methods

In this case series study, open repair was performed for 6 patients with tendo Achilles rupture. In modular operation theatre, under spinal anaesthesia, in prone position, after the tendon was debrided, ipsilateral FHL tendon was harvested from the same incision, tendo Achilles

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reconstruction was done. Fixation was done by metallic or biodegradable interference screws. The deep fascia and paratenon was used to cover the tendon. Anterior below knee splint applied for 6 weeks. Dressing done every 4<sup>th</sup> day. All stitches removed after 2 to 3 weeks. Patients were followed for 6 months and any wound complication was recorded. During the last visit, the American Orthopedic Foot and Ankle Society (AOFAS) ankle-hind foot score was completed for all patients. Calf circumference and ankle range of motion were measured and compared with the contralateral side. Patients were asked about returning to previous activities after 6-8 weeks.

### AOFAS Ankle-Hindfoot Scale

Patient Name: \_\_\_\_\_  
Patient MRN: \_\_\_\_\_  
Date: \_\_\_\_\_

#### I. Pain (40points)

None 40  
Mild, occasional 30  
Moderate, daily 20  
Severe, almost always present 0

#### II. Function (50points)

##### Activity limitations, Support requirements

No limitations, no support 10  
No limitation of daily activities,  
Limitations of recreational activities, no Support 7  
Limited daily and recreational activities, cane 4  
Severe limitation of daily and recreational activities,  
walker, crutches, wheelchair, brace 0

##### Maximum walking distance, blocks

Greater than six 5  
Four-six 4  
One-three 2  
Less than one 0

##### Walking surfaces

No difficulty on any surface 5  
Some difficulty on uneven terrain, stairs, inclines, ladders 3  
Severe difficulty on uneven terrain, stairs, inclines, ladders 0

##### Gait abnormality

None, slight 8  
Obvious 4  
Marked 0

##### Sagittal motion (Flexion plus extension)

Normal or Mild restriction (30° or more) 8  
Moderate restriction (15°-29°) 4  
Severe restriction (less than 15°) 0

##### Hind foot Motion (inversion Plus eversion)

Normal or Mild restriction (75%-100% normal) 6  
Moderate restriction (25%-74% normal) 3  
Marked restriction (less than 25% of normal) 0

##### Ankle-hind foot stability (anteroposterior, varus-valgus)

Stable 8  
Definitely unstable 0

#### III. Alignment (10 points)

Good, plantigrade foot, Midfoot well aligned 15

Fair, plantigrade foot, some degree of midfoot 8  
Malalignment observed, no symptoms 8  
Poor, nonplantigrade foot, severe malalignment, symptoms 0

#### IV. Total score

##### (100 points)

\_\_\_\_\_ Pain Points + \_\_\_\_\_ Function Points + \_\_\_\_\_  
Alignment Points = \_\_\_\_\_ Total Points/100points

#### Results

None of the patients developed wound infection. None of the patients had any discomfort around the operation area, limitation with footwear, sural nerve injury, re-rupture, and skin adhesion. The AOFAS score averaged 92.5±3. 1 patient was unable to do sports activities because of moderate pain in heavy physical exercises. The calf circumference and ankle ROM were similar between healthy and operated sides.

Table 1: Aofas score of 6 patients at final follow up

S. No.	Aofas score	remarks
1	94	Nil
2	90	Moderate pain in heavy physical exercises.
3	96	Nil
4	92	Nil
5	90	Nil
6	93	Nil

#### Discussion

The most important finding of this study is that the outcomes of AATR repair with the presented technique are favorable. We did not find any patient with wound infection which reflects the efficacy of this modification in preventing surgical wound complications.

Treatment of Achilles tendon ruptures may involve either operative repair or non-operative with supportive devices (cast immobilization or functional bracing). Generally, in athletes and young, active patients, open repair is preferred because it provides more rapid return to activity and has a high rate of return to sports. With open repair, re-rupture rate is less and better, long-term outcome are achieved. Moreover, nonsurgical treatment is usually recommended for elderly patients, individuals with partial tears and cases with predictable wound complications (e.g., diabetes mellitus patients). Wound complication is an important concern in open repair. It has been shown that poor blood supply and the thin layer of covering integument are the most probable precipitating factors that play a crucial role in increasing the risk of wound complications. The incidence of wound complications after open repair is reported to be 15 to 25%. Hence, some authors have suggested minimally invasive repair techniques to overcome this problem. Although there is a report indicating the efficacy of minimally invasive techniques in decreasing complications, there are some other studies that are inconsistent with the prior study and they have not found any significant difference between open versus minimally invasive repair. In addition, those studies have reported that the rate of re-rupture is lower in open repair.

Cretnik *et al.* indicated that there were slightly more, if not significant, re-ruptures and sural nerve injuries in percutaneous repair than open repair. Bradley and Tibone compared the open and percutaneous surgical repair and found two cases with re-rupture in the percutaneous group, while there was no re-rupture in the open group. They recommended percutaneous repair for recreational athletes and for those who are cosmetically concerned and open repair

for professional athletes. In a recent cadaveric study, Aibinder *et al.* showed that in repair using the Achillon device, 5 of 18 samples had at least one suture passing through the sural nerve. Based on these findings and our clinical experience, we prefer to use the open technique for professional and young, active athletes. Furthermore, we have looked for a method to avoid wound complications in open repair. Anatomical studies have shown that deep fascia and anterior paratenon, which almost always remain intact, contain a rich blood supply from the posterior tibial and peroneal arteries. It seems that covering the repaired Achilles tendon with these well-

perfused tissues may compensate the inadequate blood supply in this region, FHL tendon was harvested from the same incision, tendo achilles reconstruction was done. The deep fascia and paratenon was used to cover the tendon in our case study. In addition to excellent functional outcomes, we did not find any patient with wound complication or rerupture that was comparable with previous reports in minimally invasive technique studies. In 2012, Valente *et al.* repaired 35 AATR cases with the help of a minimally invasive technique and found no case with wound complications. Our study was limited by descriptive design and smaller sample size.



Skin markings

Debridement of tendoachilles

Flexor hallucis longus tendon is harvested

Reconstruction of tendoachilles with FHL.



Calcaneum tunnel

Construct id fixed with interference screw

The deep fascia and paratenon was used to cover the tendon

Healed wound

### Conclusion

The present case series study showed that FHL tendon transfer has excellent result for tendo Achilles tendon reconstruction.

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