Section: Orthopaedics

Case Report

MODIFIED MINIMALLY INVASIVE FLEXOR HALLUCIS LONGUS TENDON TRANSFER FOR CHRONIC ACHILLES TENDON RUPTURE IN A YOUNG INDIAN PATIENT: A CASE REPORT

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Received : 09/05/2025
Received in revised form : 02/07/2025
Accepted : 20/07/2025

Keywords:
Chronic Achilles rupture; Flexor hallucis longus; Tendon transfer; India; Interference screw; Minimally invasive repair.

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DOI: 10.47009/jamp.2025.7.4.100

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 530-532

ABSTRACT

Background: Chronic Achilles tendon rupture (≥4 weeks) poses significant reconstructive challenges due to tendon retraction and poor vascularity. Flexor hallucis longus (FHL) transfer is a promising minimally invasive option. **Objective:** To report the successful management of a chronic Achilles tendon rupture in a young Indian male using a modified minimally invasive technique involving Flexor Hallucis Longus (FHL) tendon transfer with interference screw and suture-anchor fixation through a single posteromedial incision, and to highlight its functional outcomes, surgical feasibility, and applicability in resource-limited orthopedic settings. **Case presentation:** A 27-year-old Indian male presented 2.5 months post-injury with a 2.8 cm full-thickness rupture and 4 cm retraction on MRI. Reconstruction used a single posteromedial incision for FHL harvest, fixed into the calcaneus via an 8 mm × 23 mm interference screw at 40° plantarflexion, with suture-anchor augmentation and side-to-side repair. Immobilization and progressive rehabilitation were instituted. **Result:** At 6 months, the patient achieved full, pain-free heel-raise strength, near-normal AOFAS score (>90), and preserved hallux function, with no wound complications. **Conclusion:** This modified minimally invasive FHL technique is an effective, low-morbidity option for treating chronic Achilles ruptures in young, active patients.

INTRODUCTION

Achilles tendon rupture is one of the most common large tendon injuries globally, with incidence rates nearing 1:10,000 annually, especially in men aged 25–40.[1] In India, though nationwide epidemiologic data are lacking, hospital-based studies reveal similar age and sex distributions, with increasing recognition of chronic ruptures due to delayed presentation.[2-4] Chronic ruptures—defined as neglected injuries persisting beyond 4–6 weeks—feature tendon end retraction, muscle atrophy, and inelastic scar tissue that severely compromise plantarflexion and gait mechanics.[5-7]

Pathophysiologically, delayed healing in chronic ruptures is compounded by poor perfusion and intrinsic tendon degeneration.[8] Gaps exceeding 2 cm typically cannot be repaired directly.[9] Autografts like FHL, hamstring, or peroneus brevis are often required, with FHL favored due to its proximity to the Achilles insertion, functional alignment with plantarflexion mechanics, and biomechanical strength.[10] Recent Indian series report favorable functional outcomes and low complication rates with minimally invasive FHL transfer.[11-15]

We present a case of a young Indian male with chronic traumatic Achilles rupture successfully treated with a modified minimally invasive FHL transfer through a single posteromedial incision, using interference screw plus suture-anchor fixation.

Case Presentation

Patient Profile: A 27-year-old male sustained an injury from a heavy object falling on the posterior left ankle. He presented 2.5 months later with persistent pain, calf weakness, and difficulty walking.

Imaging: Lateral ankle X-ray revealed disruption of the posterior soft tissue shadow and Haglund's deformity (Figure 1). MRI confirmed a full-thickness Achilles tendon rupture 2.8 cm from the calcaneal insertion, with 4 cm retraction of the proximal stump.

Clinical Examination: Positive Thompson (Simmonds) test. Palpable tendon gap. Normal contralateral side.

Surgical Technique

A single posteromedial incision exposed the Achilles tendon and sural nerve. The paratenon was incised, and degenerated tendon ends debrided. The prominent posterosuperior calcaneal tuberosity was excised. The FHL tendon was dissected distally and

ISSN (O): 2687-5365; ISSN (P): 2753-6556

harvested after simultaneous plantarflexion of the ankle and great toe. A bone tunnel was drilled anteroinferiorly through the calcaneus. The FHL tendon was secured in the tunnel with an 8 × 23 mm interference screw at 40° plantarflexion. A suture anchor was deployed at the original Achilles insertion and tied to the proximal Achilles stump. Side-to-side sutures reinforced the FHL–Achilles construct. The paratenon and skin were closed (Figure 2 and Figure 3).

Postoperative Protocol: The patient was immobilized in a plantarflexion slab for 3 weeks, followed by a neutral below-knee slab for another 3 weeks. Progressive weight-bearing and ankle ROM exercises began thereafter.

Outcome: At 6 months, the patient demonstrated pain-free single heel raise, full plantarflexion, and preserved hallux function. AOFAS score exceeded 90. No wound complications or rerupture occurred.

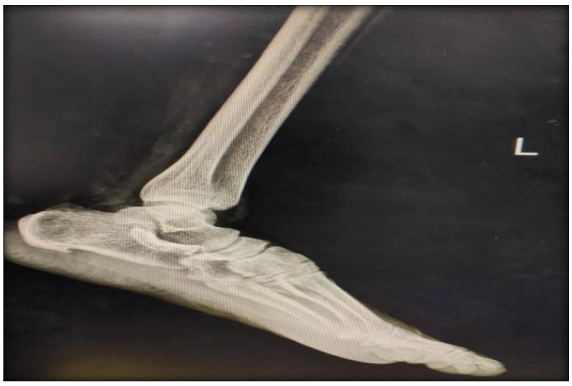

Figure 1: Preoperative Lateral Ankle Radiograph Showing Haglund Deformity (Lateral View)

This lateral radiograph of the left ankle reveals a bony prominence at the posterosuperior aspect of the calcaneus, consistent with Haglund deformity. The image also demonstrates a loss of continuity and distortion in the posterior soft tissue shadow, suggestive of chronic Achilles tendon rupture. The combination of osseous impingement and tendon disruption is indicative of chronic mechanical irritation and inflammation at the Achilles insertion site. This radiographic finding correlates with clinical symptoms of posterior heel pain and functional impairment.

Figure 2: Intraoperative Photograph Showing Chronic Tendoachilles Rupture

This intraoperative image depicts a chronic full-thickness rupture of the Achilles tendon (Tendoachilles) exposed via a single posteromedial incision. The frayed, retracted tendon ends are clearly visible, separated by interposing fibrous and degenerated tissue—characteristic of chronic ruptures. Retraction is appreciable with visible tendon stumps, and surrounding scarred tissue confirms the chronicity of the injury. Skin edges are retracted to provide optimal exposure. The field is prepared for debridement of unhealthy tissue and tendon reconstruction using the Flexor Hallucis Longus (FHL) tendon transfer technique.

DISCUSSION

Chronic Achilles tendon ruptures are increasingly encountered due to rising recreational sports participation, traumatic injuries, and delayed presentations, particularly in rural and semi-urban Indian settings.[12,13] The complexity in managing such cases lies in the tendon's poor vascularity, tendon end retraction, and intramuscular scarring, which preclude primary end-to-end repair, especially when the defect exceeds 2 cm.[5,7]

Flexor Hallucis Longus (FHL) transfer has emerged as a preferred method for such scenarios because of its anatomical proximity, long tendon length, synergistic function with the gastrocnemius-soleus complex, and ability to restore plantar flexion power without compromising foot mechanics.[9,10,12] Our case echoes this global shift toward functional reconstruction using autologous FHL, adapted here through a modified minimally invasive single-incision technique combined with interference screw and suture-anchor fixation.

In our patient, the functional outcome at 6 months was excellent, with an AOFAS score >90, full heel-rise, and no hallux deficits. This aligns with findings from Venkateshaiah et al. (2023, India), who reported significant functional improvements (mean AOFAS 89.6; ATRS 79) following FHL transfer in 22 Indian patients, with only one wound-related complication.[15] Similarly, Ahemad et al. (2022,

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India) demonstrated AOFAS improvement from 41.2 to 85.4 in 10 patients using a comparable fixation technique, without any re-ruptures or neurovascular deficits.[12]

Our technique utilized an interference screw (8 × 23 mm) and suture anchor, offering dual fixation. This parallels the dual fixation method used by Harna and Singh (2023, Punjab), who employed an interference screw plus endobutton and noted enhanced graft stability and healing in their cohort.[16] While we opted for a different augmentation strategy, the rationale—enhanced pullout strength and reduced micromotion—remains the same.

In contrast to other methods like gastrocnemius flaps or peroneus brevis transfer, our technique emphasizes simplicity and soft-tissue preservation. Jain et al. (2020, India) used a gastrocnemius flap with short FHL augmentation, which can be helpful in short stumps, but may cause additional morbidity.[19] Our results suggest that in patients with adequate FHL length, flap augmentation may not be necessary.

Furthermore, Bhoyar and Bhoyar (2024, Mumbai) treated diabetic patients using FHL with good results.[13] While our patient was systemically healthy, this affirms the method's safety in comorbid populations.

Globally, Zou et al. (2021, China) described endoscopic FHL transfer with 95% excellent outcomes and no wound complications.[17] While endoscopy offers minimal scarring, our minimally invasive open method provides comparable outcomes in Indian setups where advanced equipment may not be available.

We also adhered to controlled rehabilitation to avoid rerupture and promote healing. Apinun et al. (2020) reported similar structured post-op rehab protocols, reinforcing the role of graduated loading.[18]

In terms of biomechanical alignment, we secured the FHL tendon at 40° plantarflexion. As shown by Park et al. (2023), fixation angle directly affects tension and healing—underscoring the importance of technique over implant alone.[1]

CONCLUSION

Summary

- Our technique produced outcomes comparable to Indian and international studies.
- Functional recovery, wound healing, and tendon integration were satisfactory.
- Our findings support this method's reproducibility, cost-effectiveness, and safety.

Conclusion

Minimally invasive FHL transfer using interference screw and suture-anchor fixation through a single posteromedial incision provides effective reconstruction for chronic Achilles ruptures in young, active patients, with excellent functional outcomes and low morbidity.

Ethical Approval

Not applicable for single case reports as per institutional policy.

Patient Consent

Informed written consent was obtained from the patient for publication of this case report and images.

Conflict of Interest

The authors declare no conflict of interest.

Funding

No external funding was received.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556