

A Case Report – Augmentation Technique for Surgical Repair of Distal Insertional Achilles Tendon Tear Using 5 MM Double Loaded Suture Anchor and Flexor Hallucis Longus (FHL) Graft and Fixation in Calcaneum with Interference E Screw

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Abstract:

Achilles tendon rupture is one of the most common tendon injuries, with distal insertional tears posing a greater challenge due to poor distal tissue quality and difficulty in achieving stable fixation. We report a case of a 58-year-old female who sustained an acute distal insertional Achilles tendon rupture following a trivial fall. Clinical examination and ultrasonography confirmed the diagnosis. Surgical management included repair with a 5 mm double-loaded suture anchor using the Krackow technique, augmented by flexor hallucis longus (FHL) tendon transfer fixed into the calcaneum with an interference screw. Postoperatively, the patient underwent staged immobilization followed by progressive physiotherapy. At 6 months, she achieved pain-free ambulation and return to normal daily activities. This case highlights that augmentation using FHL transfer combined with suture anchor fixation provides a strong and reliable construct for distal Achilles tendon ruptures, ensuring early rehabilitation and favorable functional outcomes. Further studies with larger cohorts are needed to validate this technique.

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Introduction

Achilles tendon rupture is very common. Rupture in the absence of high-energy trauma occurs most often in the fourth to sixth decades of life [1] and with a more active elderly population, these tears are becoming more common in older patients [2-3]. Although ATRs most commonly occur at the mid-substance region of the tendon (2-6 cm from the calcaneal insertion), a subset of tears does rupture outside of this zone, making fixation potentially more difficult. It is recognized that distal injuries, outside of the mid-substance parameters, make fixation strategies particularly difficult. The difficulty results from the little or poor quality of the tendinous tissue remaining distally following rupture distally. This may present with the symptoms of weakened plantar flexion, pain, abnormal gait, fatigue, inability to run, heel rise, and difficulty playing sports and climbing stairs [4-5]. Either acute or Chronic Achilles tendon rupture in adults often need surgical intervention. The management options for tendon-achilles injury depend on the location of the tear, degree of retraction of the torn ends, and patient-related factors and surgeries available are direct end to end repair alone with krackow/Kessler/bunnell suturing

technique. Augmentation of the repair with flexor hallucis longus (FHL) graft and fixation in calcaneum with interference e screw and repair of distal insertional avulsion tears with double loaded suture anchors.

In this particular case, distal insertional avulsion Achilles tendon tear was repaired with double loaded suture anchor using krackow suturing technique and augmented with flexor hallucis longus (FHL) tendon transfer in calcaneum using interference screws. This augmentation technique provides adequate strength to repair and improve rehabilitation period [6].

Patient Information: A 58-year-old female housewife presented to our hospital complaining of unilateral left sided heel pain with mild swelling around ankle along with antalgic gait while walking since last 2 days. She provides a history of sudden onset of left heel pain while accidentally missing a step during climbing stairs. Weak end plantar flexion along with swelling around ankle joint and changed in normal walking gait forced her to consult in the hospital. She denied having any other medical condition, such as diabetes mellitus.

Clinical Finding: Physical examination showed that tenderness was present at her left heel at insertional site of Achilles tendon over calcaneum along with swelling around ankle joint. Plantar flexion of her left ankle was not possible and no hypotrophy of the calf muscles was noted. The patient was not able to stand on the tips of his toes. Thompson test was demonstrated keeping patient lying in prone position with knee flexed at 90 degree and found Positive. A provisional diagnosis of acute left Achilles tendon rupture was made and further work up was done on this.

Diagnostic Work Up: Bilateral ankle radiographs (X-ray) were taken to compare affected side to

normal side revealed no bone injury, after which MRI was advised but could not be obtained due to non-availability of MRI machine at institute and financial status of patient. Alternatively, USG local of left ankle was advised to check for the patency and gapping between two edges of tendon Achilles suggestive of insertional tear from calcaneum attachment with proximal stumps had retracted only 16mm from original insertion.

On the basis of clinical and diagnostic finding, operative line of management was decided for this patient once swelling around the ankle joint subsided.



Figure 1: Pre operative x-ray

Therapeutic intervention: Surgical intervention finalized in the treatment of this patient. After the administration of spinal Anesthesia, the patient was placed in the prone position, and thigh tourniquets were applied and inflated sequentially to 300mmHg after scrubbing and surgical draping. A 6-8 centimeter longitudinal incision was made up-to 1cm distal to calcaneal insertion of tendon Achilles to explore and expose the stumps and rupture sites of the Achilles tendons and the sural nerves lateral side. After the skin and subcutaneous layer on each side were incised together to form a full-thickness skin flap and Achilles tendon was reflected cranially to check for the insertional site over calcaneum. The final defect was measured with the ankle in plantigrade; the intraoperative defect was less than

1.0cm from insertion with a tear running vertically within distal end of proximal stump making an inverted Y shaped configuration. The FHL tendon was harvested in a minimally invasive manner.

First, the muscle belly and FHL tendon were exposed after taking an incision over fascia overlying flexor hallucis longus tendon slight medially, the FHL tendon was identified due to its muscular belly at this level and confirmed with pulling of tendon causing flexion of great toe. Now keeping ankle at planter flexion, further dissection was done and a transverse incision was taken over FHL tendon as close as possible to knot of Henry so that maximum length of tendon can be obtained for transfer.



Figure 2: FHL tendon identified due to its muscular belly and pulling of tendon causing flexion of great toe

Next, preparation of harvested tendon was done by taking krackow suture aka Baseball stitches using Fiber wire taking minimum 6 to 8 bites from distal end to proximally on one side and coming back again from proximal to distal end in opposite side. A bony canal tunnel then drilled using 6mm cannulated reamer slightly anterior to the insertion of tendon Achilles over calcaneum keeping ankle in

dorsiflexion followed by passing of freed end of fiber-wire from the planter side of foot using guide wire and suture loop. Afterwards, pulling the fiber-wire will cause migration of FHL tendon into prepared canal keeping the ankle in full planter flexion which then was secured in place by passing of 7*30mm interference e screw in canal.



Figure 3: Harvested FHL tendon prepared using fiber wire by krackow suture technique

A 5.0-mm-diameter double loaded suture anchor was fixed over to the attachment site of the Achilles tendon from the superior oblique to the posteroinferior side. With the ankle in maximal plantigrade, each strand of suture anchor was

separated and krackow suture was taken on both medial and lateral side of tendon Achilles at their caudal end of proximal stump completely anchoring the whole tendon Achilles at its original insertional site.



Figure 4: Repair of Tendon Achilllis at its insertion site using 5mm double loaded suture anchor

The strength of combined augmentation technique was checked intraoperative by eliciting Thompson test and found negative. A negative-pressure drainage device was installed, and Paratenon was

repaired, wound closed in layers followed by application of sterile dressing and Slab given in 20° of equines from ventral surface.



Figure 5: Intraoperative view of final augmentation technique of tendon Achillis insertional tear using FHL tendon transfer and Repair at insertional site using 5mm double suture anchor.



Figure 6: Fluoroscopy view of final placement of interference screw and suture anchor

Follow Up and Outcomes: Antibiotics were administered for 48h, and the drainage device was then removed. Suture removal is delayed till 21 days for better healing. The patient was immobilized in a non-weight bearing short leg cast for the next 3 weeks. And at 3-week post-operative, below knee slab was given in neutral position of ankle and then

in 15° dorsiflexion for next 3 weeks. Total immobilization for 9 weeks, after that partial weight bearing is initiated with boot walker and physiotherapy continued for 4 weeks. and full weight-bearing activities were started 3 months after surgery. The patient could walk normally and pain free after 6 months from the day of surgery.



Figure 7 and 8: Postoperative x ray image of Acute insertional tendon Achilli's fixation

Discussion

The Achilles tendon is the strongest and thickest tendon in the body and its commonly described as a common tendon made up of the soleus and gastrocnemius muscles, which inserts as a single structure broadly on the calcaneal tuberosity [7-8]. It is of great functional importance, aiding in the

ability to walk, run, climb stairs, and stand on tiptoes. According to the literature, The Achilles tendon is the largest, and most commonly torn tendon in the body. The Achilles is usually torn at a region of relative hypo-vascularity proximal to its insertion. However, partial thickness tears and other pathologies often occur at its insertion on the

calcaneus which is more commonly happen in elderly population. In up to 25% of patients, Achilles tendon ruptures may be undiagnosed, leading to chronic states that become difficult to treat. But when diagnosed early and in an acute phase, surgical management should not be delayed because early fixation of an acute tear will improve and shorten the rehabilitation period.

Studies found that patients with advanced age and higher BMI presented with significantly more distal insertional tears while younger patients had significantly higher rates of myotendinous tears which is the 2-6 cm region proximal to the Achilles tendon's calcaneal insertion (midsubstance) [9]. In this particular case, we focused on distal insertional avulsion tear in an elderly female. For diagnostic utilities we generally focused on radiographs of affected ankle and USG local of finding the site and gapping between two stumps on tendon. Given our findings of older patients with higher BMI having distal tears, this brings to question the utility of preoperative MRI. The debate on the use of advanced imaging for the management of ATRs remains controversial in the literature. The American Academy of Orthopaedic Surgeons' clinical practice guideline recommendation was inconclusive regarding the routine use of MRI for diagnosing acute Achilles ruptures owing to the lack of evidence in the literature to support its use. Additionally, authors have argued that MRI is often unavailable within a short time, thus leading to an unjustified delay in surgery in acute cases.

The management modalities are available for tendon Achilles injury depend on the location of the tear, degree of retraction of the torn ends, and patient-related factors and surgeries available are direct end to end repair alone with Krackow/Kessler/Bunnell suturing technique. Augmentation of the repair with flexor hallucis longus (FHL) graft and fixation in calcaneum with interference screw and repair of distal insertional avulsion tears with double loaded suture anchors. Although augmentation techniques are classically used for chronic tears but is also used augmentation techniques for acute tears. In the acute setting, augmentation can be used in patients with severe degeneration of the tendon, such as those who had a history of Achilles tendonitis [10]. Augmentation can provide a stronger fixation construct for weaker tissue, such as with FHL or FDL transfer.

In our case, we chose to use FHL transfer for Achilles tendon reconstruction. Due to proximity of the Achilles tendon, FHL harvesting avoids the need to separate blood vessels and nerves, compared with procedures using the peroneus brevis and flexor digitorum longus tendons. The FHL tendon is functionally the strongest tendon, following the triceps.[10] Moreover, its traction force line resembles that of the Achilles tendon and it shares

synchronized contraction with the triceps during the gait cycle. In addition, an FHL graft promotes vascularization of the reconstructed tendon because of its inherent blood vessels. In our case, we harvested FHL graft from midfoot proximal to Knot of Henry because we had the advantage of being a insertional tear in our case but this method is not sufficient for large defects in which a full length FHL tendon transfer will be done using a minimal invasive technique and augmentation was done in form of tendon Achilli's repair using 5mm double loaded suture anchor.

Post operative period was uneventful and Our patient could walk and jog normally after 6 months of treatment and returned to his pre-injury working condition.

Conclusion

In conclusion, the treatment of acute distal insertional Achilles tendon rupture provides more stable fixation and improve rehabilitation period and so early diagnosis of acute Achilles tendon tear should emphasize more. However, our case presents a successful reconstruction procedure used to treat the acute distal insertional Achilles tendon rupture using FHL transfer and augmentation with repair using suture anchor is an effective surgical technique with good clinical outcome. The results presented here should be supported by additional cases and long-term assessment.

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