Clinics in Surgery

Case Report
Published: 30 Jul, 2020

Achilles Tendon Reconstruction with Interwoven Flexor Hallucis Longus Tendon and Muscle Belly: A Case Presentation and Surgical Technique Guide

Nunzio Misseri[1], Hayley Iosue[1] and Mark Mendeszoon[1,2]*

[1]Department of Surgery, University Hospitals Regional Hospitals, USA

[2]Department of Surgery, Precision Orthopedic Specialties Inc, USA

Abstract

Achilles tendon pathologies are seen in a vast variety of patients. With varying degrees of involvement there are arrays of treatment modalities both conservative and surgical. Commonly, debridement of the affected tendon with repair has been used along with any bone debridement that is necessary. Tendon transfers have also been used to augment the repair, with the Flexor Hallucis Longus tendon being frequently used. This case presentation and technique guide showcases a patient undergoing Achilles tendon reconstruction while using the Flexor Hallucis Longus tendon and muscle belly as part of the final repair. A good functional outcome was noted with a 2 year follow up.

Keywords: Achilles tendinopathy; Achilles tendon reconstruction; flexor hallucis longus tendon transfer

Introduction

Achilles tendinopathies are commonly caused by overuse injuries and seen in patient populations of varying activity levels. The pathophysiology suggests that neurovascular in growth in the damaged tendon is the source of pain in these patients [1]. This pain is usually within the posterior heel about the distal Achilles tendon and can be acute or chronic in presentation. Other exam findings include pain with passive dorsiflexion of the ankle, pain with active plantar flexion against resistance, equinus, thickening of the tendon and post static dyskinesia of the Achilles tendon. Ruling out an Achilles tendon rupture with a negative Thompson test is key with examination in these patients as well as testing the ability of the tendon to load during activities which can be done by performing a single heel rise test [1]. A diagnosis can be made using a thorough clinical examination, however imaging modalities such as plain film radiography; ultrasound and MRI can aid in making a diagnosis and provide further input as to the extent of damage within the tendon. Radiographic images can be used to evaluate for ossifications within the tendon or spurring to the posterior aspect of the calcaneus. Hypoechoic areas on ultrasound and areas with increased signal intensity on MRI represent altered collagen fiber structure and increased interfibrillar ground substance [1]. Conservative treatment should always be considered in these patients ranging from immobilization, splints, orthoses, and exercise programs and anti inflammatory medications. Studies have shown heavy-load exercise programs to be one of the more effective modalities in treating Achilles tendinopathies. This comprises muscle lengthening activities, or eccentric stretching of the tendon with increasing loads as the tendon strengthens. Rompe found a 60% success rate with this type of eccentric load exercise program [2]. Exercise can be combined with orthotics and splinting, however splinting alone has not proven effective in treating more chronic pathology of the Achilles tendon. Petersen et al. found no difference in their clinical trial comparing patients treated with eccentric exercises along with bracing versus the exercise programs alone [3]. Anti-inflammatory medications such as NSAIDS and corticosteroids are also indicated in these patients with higher efficacy in acute tendinopathies and some initial effects in more chronic cases. Fredberg et al. found some initial improvement in symptoms for chronic Achilles tendinopathy in patients after ultrasound guided steroid injections [4]. If conservative measures fail, surgical treatment can be indicated. This would include debridement of the thickened tendon, resection of any prominent spurring or Haglund's deformity and reconstruction of the Achilles tendon. When needed, a Flexor Hallucis Longus tendon transfer can aid in strengthening the overall construct of the repair as described by Wapner and Mann [5]. Similarly, the primary author of this paper utilizes a modified tendon transfer to

OPEN ACCESS

Correspondence:
Nunzio Misseri, Department of Surgery, University Hospitals Regional Hospitals, USA,
E-mail: nunzio_misseri@yahoo.com

Received Date: *05 Jun 2020*
Accepted Date: *25 Jul 2020*
Published Date: *30 Jul 2020*

Citation:
Misseri N, Iosue H, Mendeszoon M. Achilles Tendon Reconstruction with Interwoven Flexor Hallucis Longus Tendon and Muscle Belly: A Case Presentation and Surgical Technique Guide. Clin Surg. 2020; 5: 2890.

Figure 1: Sagittal STIR MRI revealing inflammation and thickening of the distal Achilles and its insertion.

Figure 2: Intraoperative image displaying thickening of the Achilles tendon is visualized within its midsubstance.

Figure 3: Intraoperative image of the 10 cm elliptical wedge being excised from the central portion of the diseased tendon.

Figure 4: Intraoperative image of the Achilles tendon after debridement of diseased tissue.

Figure 5: Intraoperative image of the FHL tendon status post whip stitching technique in preparation for insertion onto the calcaneus.

Figure 6: Intraoperative image showing the FHL muscle belly as it is interwoven into the central aspect of the Achilles tendon.

increase stability and improve outcome by weaving the Flexor Hallucis Longus muscle belly to the final construct. We feel that this technique not only helps with the overall strength of the repair, but the inclusion of the interwoven muscle provides increased vascularity to the Achilles tendon. This report includes a clinical case and surgical technique guide in a patient with chronic Achilles tendinosis using Achilles tendon reconstruction with Flexor Hallucis Longus tendon transfer and interwoven muscle belly.

Case and Surgical Technique

A 38 year old active male patient presented to our office with long standing heel and Achilles midsubstance pain. The patient did not have a history of trauma or any prior surgical intervention. The patient had exhausted all conservative treatment options including physical therapy, orthoses, and corticosteroid injections with limited success. An MRI was obtained demonstrating inflammation and thickening of the distal Achilles and its insertion (Figure 1). The patient was taken to the operating room with plans for Achilles tendon debridement, Flexor Hallucis Longus transfer with interwoven muscle belly. The procedure was performed with the patient in the prone position to access the posterior distal leg and heel. A thigh tourniquet was utilized for hemostasis. A 12 cm to 14 cm incision was placed 1.5 cm medial to the Achilles tendon. Careful dissection was carried in anatomic layers utilizing sharp and blunt dissection while carefully protecting all neurovascular structures. Thickened tissue at the midsubstance of the Achilles tendon was noted around the watershed area (Figure 2). The paratenon was split longitudinally and a ten centimeter elliptical wedge was excised from the central portion of the diseased tendon (Figure 3). Any hypertrophic bone as excised from the posterior and posterior-superior aspect of the calcaneus. The Flexor Hallucis Longus sits deep to this layer (Figure 4). Once correctly identified

Figure 7: Final repaired construct with the Achilles tendon sutured over the FHL tendon transfer and muscle belly.

the FHL tendon was dissected and transected as distally enough to allow insertion into the calcaneus. The tendon was then reinforced using a whip stitch (Figure 5). The tendon was passed through and secured into the calcaneus using an absorbable tenodesis screw and is inserted just anterior to the Achilles tendon. The FHL muscle belly was tubularized into the Achilles tendon (Figure 6 and 7). Suture anchors can be utilized to re-enforce the insertion of the Achilles tendon onto the calcaneus if a large amount of bone was resected, however this was not needed during this procedure. A layered closure was performed. The patient was placed in a posterior splint with the ankle in slight plantar flexion. Once removed at about the fifth postoperative day, a non weight bearing below knee cast with the ankle in a plantarflexed position was placed for an additional 3 weeks. At the 4 week mark the patient was transitioned to a weight bearing boot for 2 to 3 weeks. Physical therapy was initiated at 8 weeks and the patient returned to regular well supportive shoe gear at 8 to 10 weeks. The patient was able to return to his normal activities without issue. He did not have any problems with great toe function during his recovery and returning to activity. Follow up is currently at 2 years from the date of surgery.

Discussion

Achilles tendinopathies are common conditions affecting patients of varying activity levels. If conservative measures are exhausted, surgical considerations include Achilles tendon debridement and repair, tendon reconstruction and tendon transfers. Multiple case reports have demonstrated the efficacy and often necessity of tendon debridement along with tendon transfers to aid in improved function and decreased pain in those patients. A prospective study by Abubeih using a single incision approach for FHL transfers in Chronic Achilles tendon ruptures found satisfying results in 21 patients with an average follow up of 15 months [6]. In their study one patient resulted in a superficial infection without any other complications or change in great toe function. Similarly, a study by Elsayed looked at 19 patients with chronic Achilles tendon ruptures which required Flexor Hallucis Longus tendon transfer with concomitant Gastrocnemius recession [7]. The AOFAS score increased from 65 to 94 with no reported dysfunction of the great toe joint. The use of the Flexor Hallucis Longus tendon transfer in the repair of Achilles tendon pathologies has been proposed because of the strong plantarflexory axis of force resembling that of the Achilles tendon. When comparing it to the Peroneus Brevis and the Flexor Digitorum Longus tendon, the Flexor Hallucis Longus has an axis of contractile force that more closely resembles that of the Achilles tendon [8]. Adding the interwoven muscle belly to the final construct may provide increased vascularity to an area of the tendon that is lacking adequate blood flow for healing. Risks of the Flexor Hallucis Longus tendon transfer are similar to that of the traditional Achilles tendon debridement. They include but are not limited to wound dehiscence and necrosis, infection, decreased tensile strength, and re-rupture of the involved soft tissue structures. The technique described in this report demonstrates clinical improvement similar to other studies using the traditional Flexor Hallucis Longus tendon transfer technique and Achilles tendon debridement. The patient presented in this case study experienced improved functional status and returned to prior activity levels with minimal pain and restrictions. The authors of this article have found successful results with this procedure and this presents an effective option for the diseased Achilles tendon. Further studies and longer term follow up is needed to continue investigating the use of Flexor Hallucis Longus transfer with interwoven muscle belly in Achilles tendinopathies.

References

1. Alfredson H, Cook J. A treatment algorithm for managing Achilles tendinopathy: New treatment options. Br J Sports Med. 2007;41(4):211-6.
2. Rompe JD, Nafe B, Furia JP, Maffulli N. Eccentric loading, shock-wave treatment, or a wait-and-see policy for tendinopathy of the main body of tendo Achillis: A randomized controlled trial. Am J Sports Med. 2007;35(3):374-83.
3. Petersen W, Welp R, Rosenbaum D. Chronic Achilles tendinopathy: A prospective randomized study comparing the therapeutic effect of eccentric training, the AirHeel brace, and a combination of both. Am J Sports Med. 2007;35(10):1659-67.
4. Fredberg U, Bolvig L, Pfeiffer-Jensen M, Clemmensen D, Jakobsen BW, Stengaard-Pedersen K. Ultrasonography as a tool for diagnosis, guidance of local steroid injection and, together with pressure algometry, monitoring of the treatment of athletes with chronic jumper's knee and Achilles tendinitis: A randomized, double-blind, placebo-controlled study. Scand J Rheumatol. 2004;33(2):94-101.
5. Wapner KL, Pavlock GS, Hecht PJ, Naselli F, Walther R. Repair of chronic Achilles tendon rupture with flexor hallucis longus tendon transfer. Foot Ankle. 1993;14(8):443-9.
6. Abubeih H, Khaled M, Saleh WR, Said GZ. Flexor hallucis longus transfer clinical outcome through a single incision for chronic Achilles tendon rupture. Int Orthop. 2018;42(11):2699-704.
7. Elgohary HEA. Combined flexor hallucis longus tendon transfer with gastrocnemius recession for reconstruction of gapped chronic achilles tendon ruptures. Injury. 2016;47(12):2833-7.
8. Wilcox DK, Bohay DR, Anderson JG. Treatment of chronic achilles tendon disorders with flexor hallucis longus tendon transfer/augmentation. Foot Ankle Int. 2000;21(12):1004-10.