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Neglected tendoachilles tear treated with flexor hallucis longus tendon transfer

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Abstract

Background: Neglected tendoachilles tear is one of the common condition that surgeons encounter and also difficult to manage. In Indian setting the most common reason for tendoachilles tear is lactory pan injury, followed by road traffic accident. Various methods of treating neglected tendoachilles tear are described in literature but no single method is stated as ideal.

Aim: The purpose of this study is to evaluate the technique, difficulties and functional outcome of neglected tendoachilles tear treated with flexor hallucis longus tendon transfer.

Materials and Methods: 10 Patients with neglected tendoachilles tear (>4 weeks) are treated with flexor hallucis longus tendon transfer are included in this study. Pre-operative evaluation done both clinically and radio logically. All patients are followed up for a maximum period of 9 months and evaluated at 2 weeks, 1, 3, 6, and 9 months. During follow-up all patients are evaluated using American Orthopaedic Association Foot and Ankle Score.

Results: All patients with neglected tendoachilles tear treated with flexor hallucis longus tendon transfer showed an average AOFAS score of 88 and was able to do single heel raise test. All patients have difficulty in hallux interphalangeal joint flexion, but no patients have difficulty in doing day to day activities.

Conclusion: Flexor hallucis longus tendon transfer for neglected tendoachilles showed good clinical outcome and patient's satisfaction with insignificant and minimal complications.

Keywords: Tendoachilles, flexor hallucis longus, American orthopaedic association foot and ankle score

1. Introduction

Achilles tendon is the strongest and largest in the human body. It is the most commonly injured tendon in the lower limb [13]. The most common cause of tendoachilles injuries in developed nations is due to trauma during sports activities [16]. The common cause of tendoachilles injuries in Indian setting is lactory pan injury and due to road traffic accident. According to literature 10-15% tendoachilles injuries are undiagnosed initially. The reason for undiagnosing tendoachilles tear is due to minimal pain and swelling and no complete loss of ankle dorsiflexion following trauma. Patient usually notice impairment in ankle dorsiflexion and difficulty in walking stairs only after few weeks and months when they return to normal activity after the trauma. Neglected tendoachilles tear are difficulty to manage compared to acute tear, the reason being atrophied and fibrosed ends of the tendons due to chronicity. Various methods of treating neglected tendoachilles tear are described in literature including end to end repair, v- y plasty described by *Abraham and Pankovich* [19], turn down flap described by *Bosworth*, tendon transfer using flexor digitorum longus [21], flexor hallucis longus, peroneus brevis [20] and plantaris. The type of injury, duration of presentation, end- to end gap decide the management. Literature does not potray no single method is ideal. In this study we will study the functional outcome of neglected tendoachilles tear treated with flexor hallucis longus tendon transfer.

Materials AND Methods

Patients: This study was done in 10 patients who presented to our institution with neglected tendoachilles tear between the periods of august 2020 to January 2022.

Only closed cases of tendoachilles tear with duration of greater than 4 weeks from the day of injury are included in this study [17]. Acute and open cases are excluded in this study. Patients with age <18 years are excluded from this study. Patients with high medical risk and who have poor healing capacity like immunodeficient patients, uncontrolled diabetes are excluded from this study.

Pre-operative evaluation

Demographic data like age, sex, date of surgery, previous medical records, history of trauma, ankle range of movements, ability to do single heel rise test, difficulty in walking, squatting and day to day activities were assessed and recorded. Thompson test was done in all patients to confirm the diagnosis clinically. All patients underwent x-ray of ankle of both anteroposterior and lateral view to rule out avulsion injuries and associated fractures. USG was done in all patients to find out the level of injury from the insertion of the tendon and to measure the defect of the tendon both in ankle dorsiflexion and plantar flexion. Defect in the tendon of greater than 6 cm in thirty degree of plantar flexion are included in this study. MRI was taken only in cases where USG ankle is not conclusive of the defect. Basic pre-operative routine was performed in all cases.



Fig 1: MRI showing TA tear

Why FHL is better?

The FHL is stronger than other tendons used for TA tear like FDL. FHL tendon is also longer which usually used for bridging large defect and its contraction is in phase with triceps surae [1, 18].

Surgical technique

After obtaining consent from the patient and after explaining the complication that there would be weakness in flexion of the hallux interphalangeal joint, all patients posted for surgery under spinal anaesthesia. Patient in prone position and under tourniquet control affected limb is painted and draped. A posteromedial approach is used to access the tendoachilles. This approach gives easy access to the flexor hallucis longus tendon and less chance of injury to the sural nerve. Skin and subcutaneous tissue incised and retracted. The paratenon was incised in line with the incision and the fibrosed tendon

identified. The ends of tendon looked atrophied with fatty infiltration on visual examination intra-operatively (figure 2). The fibrous tissue was debrided till we reach a viable tendon. The gap was measured after complete debridement and found to be a average of 6-8 cm in the cases included in this study (figure-3). The gap in the TA was utilized to access the FHL tendon anterior to the TA. The muscle was identified after flexing the interphalangeal of the great toe and its tendon traced inferiorly as much as possible and excised (figure-4). Krackow stitches were placed on the FHL tendon for easy handling. The width of the tendon was measured using a gauge and appropriate-sized drill was used to create a tunnel into the calcaneus, just anterior to the insertion of the TA usually avoiding the calcaneal tuberosity (figure-5, 6). The FHL tendon was passed into tunnel created in the calcaneum and fixed with an interference screw while holding the ankle in about 60 degrees of plantar flexion (figure-7). Myoplasty of the FHL with proximal part of tendoachilles was done (figure-8). The deep fascia was closed, followed by interrupted absorbable stitches for the subcutaneous layer. The skin was closed using nylon with interrupted mattress sutures.



Fig 2: Showing fibrosed tendon



Fig 3: Showing measurement of gap after debridement

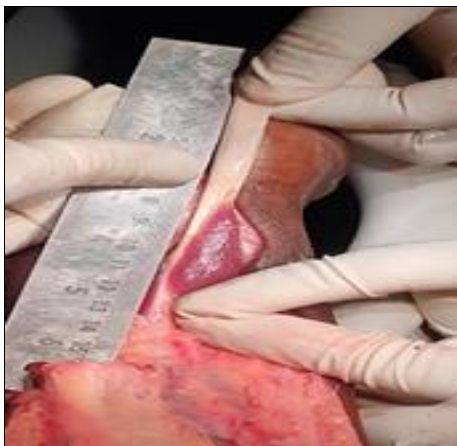


Fig 4: Showing harvested FHL tendon



Fig 5: Drilling of hole into the calcaneum



Fig 6: Showing c - arm image

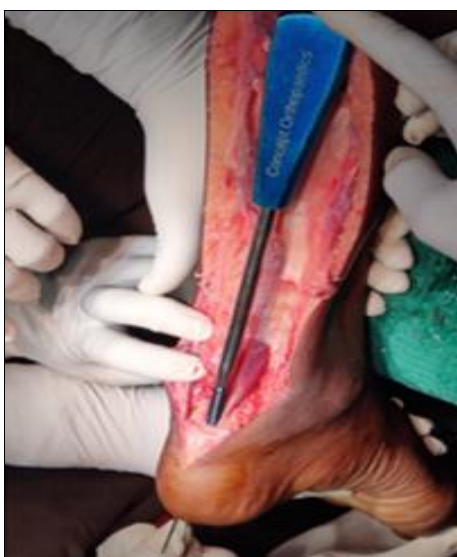


Fig 7: Fixing FHL Tendon into the calcaneum



Fig 8: Showing myoplasty of FHL and TA proximally



Fig 9: Showing post-op x ray

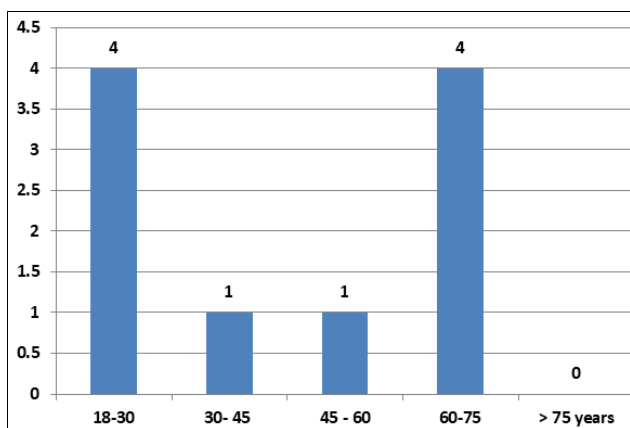
Post-Operative Protocol

All patients were in above knee slab for 2 weeks until suture removal, with ankle in maximum plantar flexion. Patients were maintained in above knee cast with ankle in maximum plantar flexion for the next 4 weeks. Then patients were immobilized in below knee cast with ankle gradually moved from plantar flexion to neutral and then into dorsiflexion for next 4 weeks. At 8 weeks post-op patients were started on non-weight bearing mobilization and weight bearing started at 10 weeks.

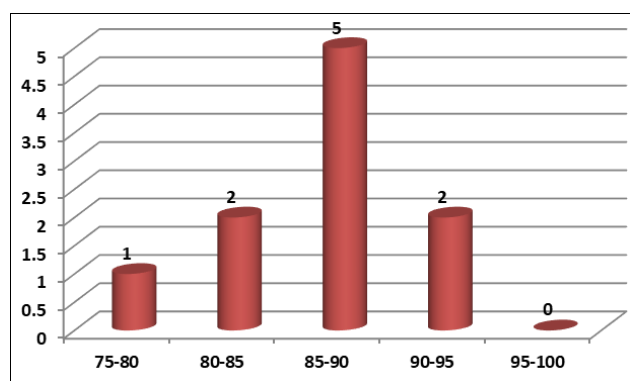
Results

The study is done in 10 patients who satisfied our inclusion criteria. We see a bimodal distribution in the age group of the study population. Most of the patients are in the age group between 18-30 years and between 60-75 years (Graph-1). Out of the 10 patients in this study 7 patients had injury in the right side and 3 patients have left sided injury. All cases had history of trauma and duration between day of injury and presentation to our institution is greater than 4 weeks. All cases were closed during presentation, but 2 patients had history of open injuries, was treated elsewhere and the diagnosis of tendoachilles injury was missed and presented to our institution after 4 weeks [16]. The average gap of the tendon after removing the fibrosed tissue with ankle in 30 degree plantar flexion is about 7.8 cm. The mean AOFAS

score pre-operatively is about 67 and the mean AOFAS score post-operatively at 6 months follow-up is about 88 (Graph-2). All patients were able to do single heel rise test post-operatively at 3 months.



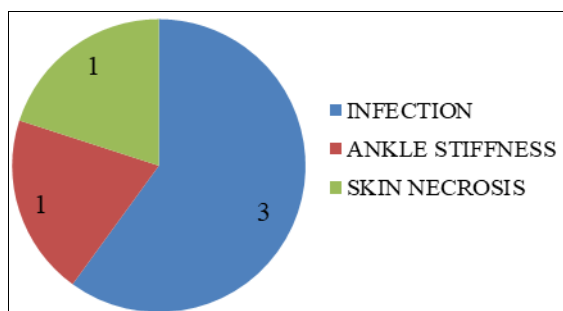
Graph 1: Age in years



Graph 2: AOFAS score

Complications

All patients had ankle stiffness immediately after removal of plaster post-operatively but most of the patients recovered completely with post-operative rehabilitation with physiotherapy. Only 1 patients have restricted dorsiflexion at the end of 3 months. 3 patients had superficial infection which was treated with antibiotics. Only one patient had skin necrosis which was treated with split skin graft. Calf muscle atrophy was noticed in majority of patients but recovered in all patients once mobilization was started. No case of scar dehiscence and tendon rerupture was noted. All patients had difficulty in hallux interphalangeal joint flexion as we followed single incision technique rather than a routine *wapner et al.* technique where the FHL stump is sutured to the FDL tendon, but no patients complained of difficulty in day-to-day activities.



Graph 3: Complications

Discussion

Management of neglected Achilles tendon tear still remains challenging, even with numerous ways and techniques to treat. No single method is ideal and appropriate according to the literature and there is paucity of literature in selecting single best method to treat tendoachilles tear especially in Indian setting. Achilles tendon have peculiar blood supply from the anterior paratenon and there is a watershed area at about 3-6 cm from its insertion into calcaneum. This hypo vascular watershed area is the most common site of Achilles tendon tear [3, 4, 7]. *Lead better* in his studies has found that repeated micro trauma to the tendon has increased the chance of closed tear [5, 6] and in our study 4 patients who are in the age group between 18-30 years have history of heavy physical work and 2 patients have history of sports activities regularly. Another 4 patients are in the age group between 60-75 years have associated diseases like renal failure, diabetes mellitus. This suggests that though trauma is the causative factor for tendoachilles tear in all cases in our study, there is a associated predisposing factor present in majority of cases with closed tear. *Bevilacqua* has reviewed various papers and articles in treating neglected tendoachilles tear and has found that FHL tendon is one of the best tendon to repair and augment neglected tendoachilles tear¹⁴. In the technique described by *wapner* which is double incision technique with FHL stump sutured to FDL, no difficulty in Hallux interphalangeal joint flexion [1, 2]. *Coull et al.* have studied series of cases done with double incision technique and has given similar results⁸. In our study we have done a single incision technique which is similar to traumatic tear of FHL and all patients have difficulty in flexing the interphalangeal joint of great toe [9, 10, 17]. Despite this risk literature suggest minimal complications and morbidity with this single incision technique. *Wegrzyn et al.* in their study with mean follow up of about 6.6 years suggested difficulty in flexion of interphalangeal joint of great toe but noticed that no one had difficulty in day to day activities and found that they don't have difficulty even during sports activities¹¹. Our study also give similar results with loss of flexion of hallux interphalangeal joint but without any functional comorbidity. The average tendon gap in MRI in our study is about 4.3 but the average gap after debridment of fibrosed tendon ends is about 7.8 cm. We infer that MRI can be used only to diagnose the site of tear and the gap of tendon should be measured only intraoperatively after thorough debridment of the tendon. So clinical examination is extremely important for pre-operative planning¹². The mean pre-operative AOFAS scale is about 67 which suggested that there functional disability of ankle with tendoachilles tear even if it is fibrosed. This mean AOFAS score increased to about 88 in our study post operatively. Studies done by *Haijiao et al.* and *Ahmed Hassan et al.* give similar results with FHL tendon transfer [13, 15]. There is no tendon re-rupture was noticed in our study, like other studies like *Raghunandhan et al.* done on FHL tendon transfer in Indian setting [1, 17]

Conclusion

Our results shows that flexor hallucis longus tendon transfer for neglected tendoachilles tear gives excellent clinical outcome with insignificant and minimal complications. The limitations of our study is that it was done with small study population and without any control group

Conflict of Interest

Not available

Financial Support

Not available

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