International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979
Impact Factor: RJIF 5.72
Received: 04-02-2018; Accepted: 07-03-2018
www.allsubjectjournal.com
Volume 5; Issue 3; March 2018; Page No. 40-43

Neglected tendoachilles rupture treated by reconstruction by teuffer's technique

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Abstract
Background: We present the results of reconstruction of neglected tendoachilles rupture with Peroneus Brevis tendon.
Patient and Methods: 20 patients with neglected rupture of Achilles tendon treated between 2012 and 2015 were included in the study. We performed our reconstruction by Teuffer's technique in which peroneus brevis tendon of the same side was harvested. In all cases, a below knee cast was applied in 20 degrees of plantar flexion. Total period of immobilization was 6 weeks. Modified Rupp score was used to evaluate the outcome.
Results: All patients achieved excellent subjective and functional outcome. All of them were able to return to previous sport activity. Two patients developed necrosis and raw area over heel which required split skin grafting. One patient developed surgical site infection which required debridement. Five patients had stiffness of ankle due to post operative adhesions which gradually improved. The mean Rupp score was 28(3-33).
Conclusion: Reconstruction of chronic neglected tendoachilles rupture with peroneus brevis tendon provides a good outcome. When compared to similar studies, our method was found to be superior and associated with less complications.

Keywords: tendo achilles, tueffers technique, peroneus brevis

Introduction

First described by Ambroise Pare in 1575 and reported in the literature in 1633.The Achilles tendon by virtue of being the strongest and thickest tendon, influences the biomechanics of many body movements. It connects the gastrosoleus to the calcaneus to allow plantar flexion about the ankle joint. When the calf muscles flex, the Achilles tendon pulls on the heel. This movement allows to stand on our toes when walking, running or jumping. Rupture of Achilles tendon is both a serious and debilitating injury, affecting 1 in 5000 people, typically males between 30 and 50 years of age. The common site for rupture is approximately 3 to 5cm from the insertion. Generally, 6 weeks following a rupture, a direct repair becomes increasingly difficult. Repair in chronic neglected cases is one of the most difficult and challenging procedures for the surgeon. Several techniques and their modifications have been described in literature to treat this condition. Teuffer *et al*. described the method of reconstruction of chronic ruptures with peroneus brevis. At our centre, most of the chronic neglected ruptures are treated by this technique. The purpose of our study was to report the results and complication of our case series of neglected ruptures of tendoachilles treated by this technique.

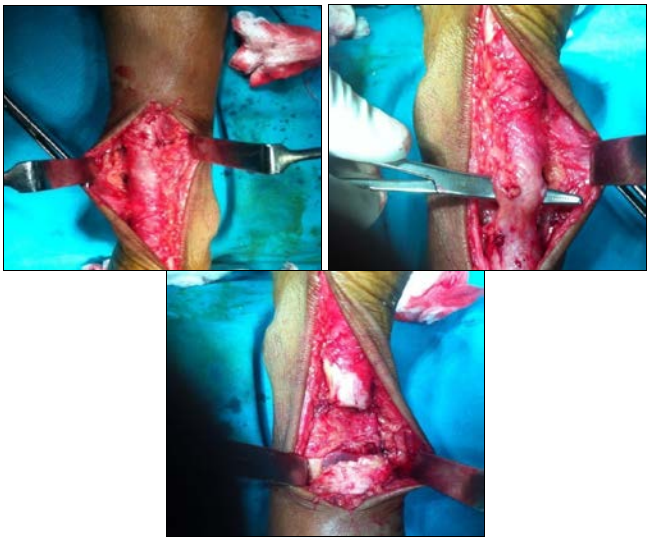
Patients and Methods

A prospective study was carried out from 2012 to 2015 in our institution comprising of 20 patients in which a diagnosis of neglected tendoachilles rupture was made. In all patients, we performed Thompson's squeeze test and palpated a defect in continuity of tendoachilles. Ultrasonography was done to assess the defect. Inclusion criteria were chronic rupture at least 6 weeks old, age more than 16 years. Bilateral ruptures were also included.

Patients with acute ruptures, open injuries, associated with fractures, previous tendon rupture or surgery and were excluded. Of the 20 patients,14 were male.6 cases were bilateral ruptures. All were of managed with reconstruction with peroneus brevis. The age of patients in study group ranged from 16 to 65 years. Average time between injury and surgery was approximately 2 and half months. The mean age at the time of injury was 36 years. Mean follow up time was two and half years.10 patients had sustained the rupture during a sports related activity. The modes of injuries were fall into a pit, football and road traffic accidents, especially two wheelers. Four patients were diabetic, two patients had history of steroid inhalation.

Operative Technique

The tendon was reconstructed under general anesthesia. After applying tourniquet, patients were positioned prone. A 5cm longitudinal incision,2cm proximal and just medial to the palpable end of proximal stump was made. Incision was extended distally upto the lateral margin of the distal stump.

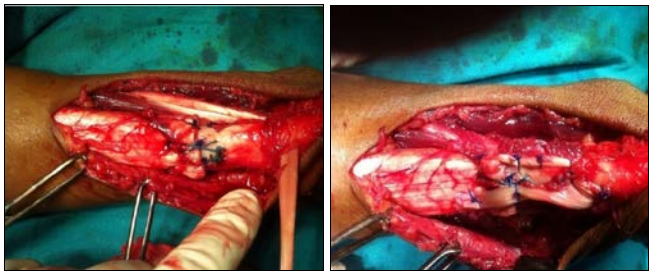


Special care was taken to avoid injury to sural nerve. Another 2cm incision at the base of 5th metatarsal.

The distal stump was mobilized after freeing from all peritendinous adhesions.

Resected the ruptured tendon end back to healthy tendon and placed a locking suture along the free tendon edge to prevent separation of bundles. Mobilised the proximal stump, adhesions released to allow maximal excursion and minimize the gap between the tendon stumps.

Ankle plantar flexed. Through the distal incision over Achilles tendon, incised the deep fascia overlying the peroneal muscle compartment. Withdrew the peroneus brevis tendon. Mobilized the muscular portion of the peroneus brevis proximally to increase its excursion. Through a longitudinal tenotomy, peroneus brevis graft was passed. With the ankle in maximum plantar flexion, sutured the peroneus brevis to both sides of the distal stump. Passed the graft proximally and sutured to the proximal stump.



Wound closed in layers and below knee cast was applied in equinus.

The mean operative time was one hour (range 45-70 minutes), mean tourniquet time was 55 minutes(range 40-65 minutes).

Post-Operative Care

Serial wound dressings were done through a window over the cast. Sutures removed on post-operative day 12. Cast immobilization was continued for a total period of 6 weeks. After removal of cast, patients were allowed to start partial weight bearing and ankle range of motion exercises. During that time, crepe bandage was applied. Amount of weight bearing increased progressively.

Running, jumping, walking on uneven surfaces were not allowed up to 3 months post-operative period. Previous sports activities were allowed after 6 months.

Evaluation

All patients were followed up at 6 weeks, 3 months, 6months, one year and two years. We evaluated the ankle range of motion with a goniometer, stiffness, sensory blunting over sural nerve distribution, amount of pain and subjective satisfaction. In reference to Kitaoka *et al*., we assessed the factors specific to tendoachilles rupture, plantar flexion strength with tiptoe test, the ability to do repeated toe raises and single limb hopping. We used the modified Rupp score to evaluate the subjective outcome. Results were rated as excellent (>30 points), good (15-30 points), fair (5-15 points) and poor (<5 points).

Results

The mean follow up time was two and half years. All patients returned to pre injury level of activities. The average ankle plantar flexion was 28 degrees (range 22-35) on the operated side. Average dorsi flexion was 15 degrees (range 10-20). None of the patients changed the job because of the injury and surgical procedure. Ten patients were active in sports and reported as well conditioned after the final follow up. None of the patients had sensory blunting or hypoaesthesia over sural nerve distribution. Two of the diabetic patients developed wound dehiscence and superficial infection which required

debridement. One patient developed necrosis and deep infection with raw area over heel which was managed by debridement and split skin grafting at a later date. All of them returned to pre injury level within 3-4 months. None of the patients had re rupture. Five patients developed stiffness of ankle movements due to adhesion, out of which two were having hypertrophic scars. Three patients developed difficulty in walking on uneven surfaces and hilly roads. Pain over surgical site was reported in five patients. They were specifically evaluated by using visual analogue scale. The mean visual analogue score was 7.4 in those five patients (range 5-10). The mean Rupp score was 28 (3-33).The outcome of 91% of patients was considered good to excellent.

Discussion

Chronic neglected rupture of Achilles tendon is a serious injury for which the best treatment is still controversial. Treatment should be thought in an attempt to optimally restore the tendon length, tension and stiffness [2]. Above all, the surgeon should evaluate a patient's functional requirements carefully. Care should be given to prevent excessive elongation of tendon which is associated with a poor clinical outcome.90% of the patients injured the tendon while playing some form of sport [6, 7]. Etiology of the Achilles tendon rupture remains unclear, but some studies have supported theory of chronic degenerative changes based on histological examination. Pathological changes like hemorrhage and inflammation are attributed [18]. In our study, none of the patients had any kind of symptoms related to chronic tendinitis.

There are many treatment options for neglected rupture of tendoachilles. The main indication for surgical reconstruction is an active patient who demands to return to pre injury level functional status. To approximate a poor quality tendon is a tedious task. The incidence of sural nerve injury and re-rupture rate seems to be higher with many of the techniques [12, 13] Augmented repairs which are well studied provide stronger reconstruction and give more stability to the repair. The disadvantage of those studies was that the authors did not consider the strength of the augmented tendon and applied more or less the same rehabilitation programmes. Increased rate of wound complication and infection due to the more extensive approach is another disadvantage of augmented reconstruction.

In all our patients, we found larger gaps (>2cms) between two cut ends of Achilles tendon. So, the primary aim was to bridge the defect by tissue which can unite the cut ends with acceptable strength and allow full range of tendon excursion.

Tensile loads cause viscoelastic response at the muscle-tendon unit and ruptures are most commonly seen at the musculo-tendinous junction [19, 20, 21]. The use of peroneus brevis for reconstruction of chronic ruptures is well established. Our technique of using peroneus brevis is advantageous in patients involved in sports, leaving minimal or no objective plantar flexion weakness following the procedure. The minimum re-rupture rate, less extensive approach, proximity of peroneus brevis, less rates of wound related complications, early mobilization are other major advantages. Peroneus brevis fulfils many of the criteria for tendon transfer. The tendon has an acceptable strength of around 118N/mm [2, 24]. It has similar line of pull, in phase, has adequate excursion and is expendable. Marked ease in identifying the tendon, less tedious graft harvesting are other advantages of our technique

In conclusion, our technique of reconstruction of tendoachilles using peroneus brevis yielded favourable subjective and functional outcome in most of the patients. The limitation of this method is that there will be marked reduction in eversion strength which is a major determinant in the activities of sportspersons.

Conflict of Interest

The author(s) declare they have no competing interests.

Acknowledgement

We thank all the staffs in Department of Orthopaedics in Pariyaram medical college, Kannur, Kerala in completing our study.

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