OUTCOME OF PERONEUS BREVIS TENDON TRANSFER FOR AUGMENTATION OF REPAIR OF OLD COMPLETE TEAR OF ACHILLES TENDON

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ABSTRACT

Background: Repair of complete tear achilles tenden is a challenge for orthopedic surgeons. **Objective:** To assess the outcome of peroneus brevis tendon transfer for augmentation of repair of the old tear of the Achilles tendon. **Methodology:** Study Design: Prospective case series study. Place of Study: Orthopaedic Complex, Quaid e Azam Medical College/ B. V. Hospital, Bahawalpur, Pakistan. Study duration: 1st October 2013 to 30th September 2017. A total of 52 patients (42 males and 10 females), age range 38 to 52 years who underwent repair of old tear of Achilles tendon augmented by peroneus brevis tendon transfer, were included. All patients were having closed rupture. Postoperative follow up evaluation was done for a period of 12 months by using modified Rupp score. Data analysis was done by using SPSS version 17. **Results:** 52 patients were operated of which 5 suffered minor skin complications which recovered subsequently. No patient suffered repeat tear of the repaired tendon. Subjective postoperative evaluation was done by modified Rupp score questionnaire while objective follow up evaluation was done on the basis of ankle range of movements, ability for raising over the tip toes and sensory/motor status over the foot. At 12 months follow up 25 (48%) patients has excellent, 16 (30.7%) patients has good, 7 (13.4%) patients has fair while 4 (7.10%) patients had poor functional outcome. **Conclusion:** The peroneus brevis tendon transfer for augmentation of repair of old tear of Achilles tendon achieved good to excellent functional outcome in majority of the patients.

Key Words: Tendo Achilles Rupture, Augmented Repair, Peroneus Brevis tendon Transfer

INTRODUCTION

Achilles tendon is the most commonly ruptured tendon in the body. The annual incidence is about 21 ruptures per one lac persons per year.[1] The people affected are usually between the age of forty to sixty years who show increased interest in sports and recreational activities.[2-4] Usually there is history of sudden popping followed by pain over the back of ankle. Sometimes there is history of steroid injection over back of ankle. As a result of this injury there is difficulty in gait, running, jumping and ascending or descending stairs because of the dominant role of tendo Achilles for these activities.[5] As the injury gets older there may also be calf atrophy.

There is usually visible as well as palpable defect over back of ankle and the person is unable to stand or walk over the tip toes on the involved lower limb. The calf squeeze test is usually performed while the patient is in prone position for the clinical diagnosis of this injury. In a normal person with intact tendon, foot will plantarflex involuntarily but would be still in case of tendo Achilles rupture. Within few weeks the ruptured tendon ends significantly get apart along with fibrosis in the gap. Diagnosis can usually be made clinically but the x-rays can help rule out the associated calcaneal fracture while ultrasound and MRI can confirm the tendon rupture.[6] The site of rupture is typically four to six centimeters superior to the calcaneal tuberosity where the Achilles tendon is inserted. This area has poor blood supply due to less number of blood vessels.[7]

The disability due to the injury usually demands some type of surgical intervention and in case of old injuries there is often significant defect between the ruptured ends of the tendon which further increases while trying to freshen the tendon ends which necessitates some type of augmentation by healthy and normal tissue. If the defect between the tendon ends is greater than three centimeters (a usual occurrence) after freshening of the tendon ends, additional techniques of augmentation become necessary.

Multiple techniques of augmentation have been described in literature which involve the transfer of the tendon of flexor hallucislongus, flexor digitorum longus, peroneus brevis or plantaris muscle[8,9] with advantages and disadvantages associated with each technique. Perez-Teuffer introduced the technique in which peroneus brevis tendon was transferred by making a calcaneal tuberosity tunnel for augmentation of the repair of neglected tendo Achilles ruptures.[10,11,12]

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We performed procedures in which peroneus brevis tendon transfer was used for strengthening of the repair of old tear of Achilles tendon, and assessed the outcome.

METHODOLOGY

This was a prospective case series study done at Orthopaedic Complex, Quaid e Azam Medical College/ B. V. Hospital, Bahawalpur from 1st October 2013 to 30th September 2017. 52 patients were operated in which peroneus brevis tendon was transferred for strengthening of the repair of old complete tear of the Achilles tendon. Range of the age was from 38 to 52 years. All patients were having closed chronic rupture. Patients fit for anesthesia were included in the study while those having history of open traumatic rupture or diabetic and peripheral vascular disease patients were excluded from the study. 8 patients gave history of local steroid injection for the treatment of posterior heel pain while rest of the patients suffered the ruptures spontaneously.

During surgery the tourniquet was applied at thigh and prone positioning was used. Patients were operated under general or regional anesthesia. Ruptured ends of tendo-Achilles and calcaneal tuberosity were exposed through posterolateral incision by identifying and protecting sural nerve. Margins of the ruptured tendo-Achilles were freshened and intervening scar tissue excised. Peroneus brevis tendon was detached from its insertion at the base of 5th metatarsal and delivered through first incision and was passed through calcaneal tuberosity from lateral to medial and sutured to the proximal stump of the Achilles tendon. Plantaris tendon was identified, harvested and sutured between the cut ends of tendo Achilles in figure of eight manner and the end of plantaris tendon was fanned over the repair for a smoother surface. Sheath of the tendo-Achilles and subcutaneous tissues were closed with non-absorbable sutures.

After performing skin closure sterile dressing was placed and long leg plaster of Paris cast was applied by incorporating the knee and ankle in flexion and plantar-flexion respectively. Crutch walking without weight bearing was allowed as comfortable for the patient. Stiches were removed at two weeks along with isometric exercises started. Plaster of Paris cast was worn up to six weeks and then gradual weight bearing was started. Modified Rupp score was used for evaluation of the results during 12 month follow-up period. Both objective and subjective evaluation was done during the follow up. Subjective evaluation was done by using modified Rupp score. Following parameters were considered during the follow up objective evaluation: Range of motion over ankle, Neurological status of the foot and ability of the patient to stand over the tip toes on the operated side. The data was entered and by using SPSS version 17.

RESULTS

Out of 52 patients 42 (80.7%) were male and in 37 (71%) right side was affected. Of the 52 patients operated, 5 developed superficial skin and wound edge complications (Figure I) which were treated accordingly by dressings and medication. No patient developed gross infection.

Figure I: Post-operative complications

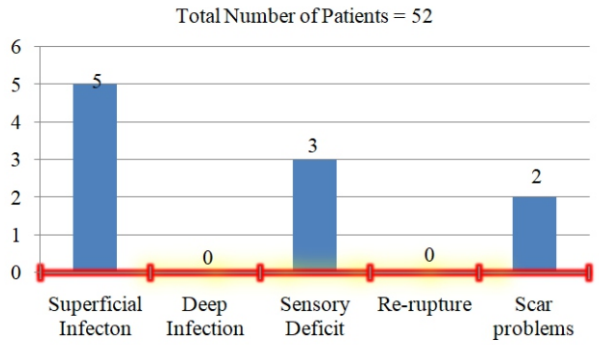
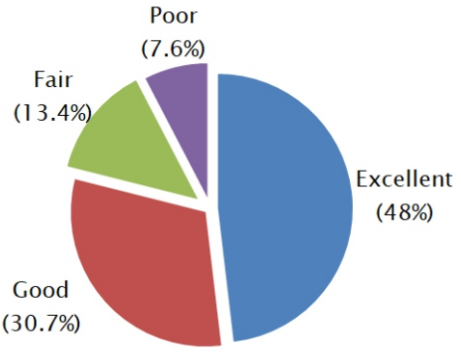


Table I: Post-operative Objective Criteria Findings

Objective Criteria		Operated Side	Normal Side
Range of Movements	Plantar flexion Dorsi-flexion	28 degree 16 degree	36 degree 26 degree
Raising over tip toes	Persistent for >60 sec <60 sec Unable	 42 patients 06 patients 04 patients	
Sensory deficit over the area supplied by sural nerve		03 patients	

Average plantar flexion was 28 degree and average dorsiflexion was 16 degree. 42 patients were able to stand over tip toes for more than 60 seconds. 6 were able to rise for less than 60 seconds and 4 were unable to raise at all (Table I). Overall results at the end of the follow up based on modified Rupp Score were excellent in 25 patients (48%), good in 16 patients (30.7%), fair in 7 patients (13.4%) and poor in 4 patients (7.6%). (Figure II)

Figure II: Subjective criteria findings (Modified Rupp score) at follow up



DISCUSSION

The management of the old tear of the Achilles tendon needs consideration of some special features/aspects relevant to this injury. First of these is the inherent poor blood circulation of the rupture site which forms the basis of the spontaneous rupture. Second is the skin overlying the tendon which has very low subcutaneous fat while third is the defect between the tear ends of the Achilles tendon which develops within few weeks of the injury.[13] The tendo Achilles has a very significant role in the body due to its function during basic activities of daily life like walking, running, jumping, going upstairs and so on where it has to bear weight of the whole body.[14,15,16]

There are multiple options for the management of the old tear of this tendon which range from closed methods like orthosis, direct approximation of the injured ends and the repair strengthened with some tendon transfer.[11,12] Victims of chronic degenerative rupture are usually the active individuals of the middle age group which usually do not accept the orthosis treatment due to its dependency and associated permanent morbidity.[17]

Direct end to end repair is difficult, usually not successful in chronic ruptured tendon and not suitable due to already poor blood supply which usually forms the basis of the rupture.[13,14] The gap and poor blood supply demand some procedure which can address these aspects at the same time. Both of these problems are dealt with the transfer and augmentation with some vascularized tendon.[18] The vascularized tendons available in the area for this purpose are those of flexor hallucislongus, flexor digitorum longus, peroneus longus, peroneus brevis and plantaris tendons.[15-17] The flexor hallucis longus and flexor digitorum longus tendons can be used but their transfer usually leads to significant disability regarding the maintenance of medial longitudinal bony arch of the foot.[18,19] The peroneus longus tendon maintains the tranverse arch of the foot and so not suitable for this purpose. The plantaris tendon is a very weak structure and cannot solely take over the function of tendo Achilles.[20]

Keeping in view the above factors for normal function of the foot, the peroneus brevis tendon is a suitable option for augmentation because its transfer leads to minor disability of weakness of eversion, as compared to its beneficial role regarding its transfer as a strong vascularized musculo-tendinous structure.[21-23]

However, the use of peroneus brevis tendon transfer is also associated with some complications because of the relatively less blood supply in the area, thin overlying skin which can lead to skin healing problems. In one study, 20% patients developed wound complications[22] more than our study where 9.6% developed wound complication. While considering the weakness in plantar flexion and eversion after transfer of the peroneus brevis tendon for tendo Achilles rupture, Galant et al[24] observed mild objective weakness regarding these two aspects [24] but in our study we noted such weakness in 4 (7.69%) patients.

There are few deficiencies associated to our study. One is that in our study all the patients were of closed rupture group without any pre-existing overlying skin complication associated with trauma like irregular scars and no patient was from the subgroup like athlete or heavy mechanical laborer. So there is still further need for the study of the results of this procedure in different specific subgroups like open injuries, athletes and heavy weight lifters or laborers.

CONCLUSION

Reconstruction of old ruptures of the Achilles tendon augmented with peroneus brevis gives strong, stable and satisfactory repairs with favorable clinical results in most of the patients. Some complications, are however associated with the procedure which include infection and other wound related complications which can be prevented taking the special care at every step of the procedure.

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