

Study of Tendo-achilles reconstruction using Flexor hallucislongus auto-graft

*Dr. Vinod Kumar, **Dr. Jayant Thipse,
*** Dr. Vikrant Ghanwat

*Resident, **Professor, *** Lecturer

Corresponding Author : Dr. Jayant Thipse

Mail id : v3081984@gmail.com

Mobile No.: 7030748811

Address : Dept.of Orthopaedics, D. V. V. P. F's Medical College and Hospital, Vilad Ghat, Ahmednagar-414 111

Abstract :

Introduction : In the lower limb, Tendo - Achilles is the most common ruptured tendon and accounts for 20% of major tendon injuries. Tendon repair can be considered after debridement for defects in the tendon which measure less than 3 cm or time since trauma less than 3 months. In cases where defect is larger than 3 cm reconstructive procedures such as local tissue transfer, tissue augmentation, V-Y Gastro-soleus recession and local tendon transfers are preferable. **Aims and objectives :** To evaluate the functional outcome of Tendo-Achilles Reconstruction using Flexor HallucisLongus tendon auto-graft over a period of 6 months. **Materials & Methodology :** 10 patients with chronic tear of Tendo-Achilles were treated with Tendoachilles reconstruction using flexor hallucislongus autograft. There were 7 males and 3 females with a mean age of 43.2 years. **Result :** Satisfactory outcome was obtained in 8 out of 10 cases with average return to normal activity at 3 months post op. **Conclusion :** Reconstruction of Tendo - Achilles using FHL auto-graft has an initial learning curve. The power of Tendo - Achilles is significantly restored. Satisfactory patient outcome guides us for selecting this procedure as the procedure of choice in chronic tears.

Keywords : Tendoachilles, Tendoachilles reconstruction, Flexor hallucislongus, Chronic Tendoachilles rupture.

Introduction : In the lower limb, Tendo-Achilles is the most common ruptured tendon and accounts for 20% of major tendon injuries.¹ Achilles, the Greek warrior had invincible powers except at both the ankles. In the Trojan War, Achilles killed Hector who was the Prince of Troy. Later, Achilles was killed by Hector's brother Paris with assistance from Apollo, in revenge by shooting a poisoned arrow in Achilles' unprotected ankle.² There are two methods of treatment, conservative and operative. The advantages of non-operative treatment are that it avoids the risk of surgery, decreases patient costs and there is no chance of infection or wound healing problems. On the other side the disadvantages of it are there is a reduction in gastrocnemius and soleus muscle power, chances of healing are less and even if healing occurs there are higher re-rupture rates. Tendon repair can be considered after debridement for defects in the tendon which measure less than 3 cm or time since trauma less than 3 months. In cases where defect is larger than 3 cm reconstructive procedures such as local tissue transfer, tissue augmentation, V-Y quadriceps-plasty and local tendon transfers are preferable.³ Makoto Takeuchi, Naoto Suzue et al used semitendinosus graft to reconstruct chronic Achilles tendon rupture and found favourable outcomes.⁴ We conducted a similar study to find the efficacy of using Flexor HallucisLongus Auto-graft to reconstruct chronic tears of the Tendo-Achilles.

Aims and objectives : To evaluate the functional outcome of Tendo-Achilles Reconstruction using Flexor HallucisLongus tendon auto-graft.

To compare the results of this study with the existing studies.

Material and method : The materials required for the surgery are FHL tendon, Tendon Stripper, 8 mm Drill bit, Ethibond in addition to the general surgical equipments.

Inclusion Criteria:

- Tendo-Achilles tear with defect more than 3 cm associated with difficulty in walking

- Patients were unable to perform heel raise and had a positive Thompson's test
- Time since trauma more than 3 months(chronic tears)

Exclusion Criteria:

- Poor skin condition
- Diabetic patient
- Bleeding disorder

Figure 1: Breech in continuity

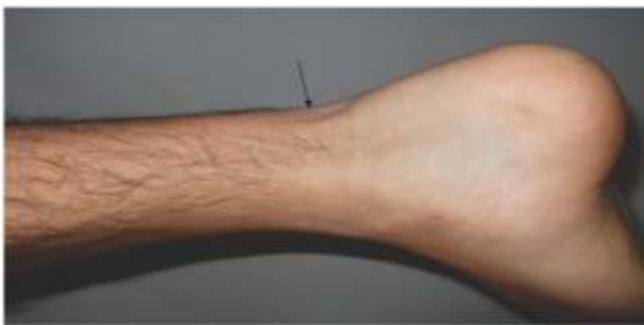


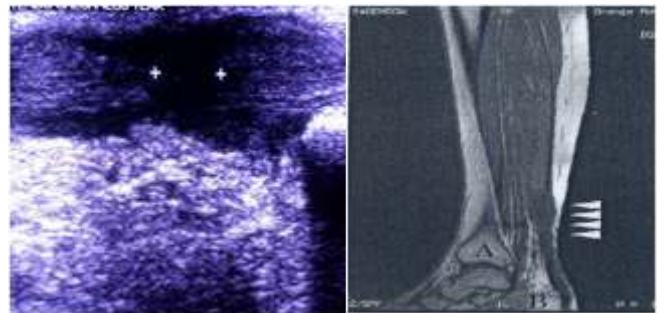
Figure 2: Heel raise test



Figure 3: Thompsons test



USG MRI



Method : My study is a prospective longitudinal observational study carried out in a rural set-up from the 1st of August 2015 to the 31st of January 2016. All patients admitted to the hospital meeting the inclusion and exclusion criteria and willing to undergo operative procedure were taken in the study after proper pre-operative assessment, pre-anesthetic fitness and consent. The minimum follow up was done for a period of 1 year post-operatively.

Procedure : Posterior medial para-median approach was taken

Soft tissue and para-tenon were dissected

Tendo-Achilles stump margins were debrided.

Tunnel created in the proximal and distal stump using 8 mm PFN drill bit

Figure 4: Tunnel created in the proximal and distal stump



Flexor Hallucis Longus auto-graft was harvested from a medial incision over the fore-foot.

The graft separated from surrounding soft tissue using ACL kit tendon stripper.

The distal FHL was sutured with FDL tendon.

The proximal FHL was pulled out through the main incision.

Figure 5: Pulled out Flexor Hallucis Longus



The harvested graft was then passed through the proximal and distal stump tunnel and sutured in place using no. 5 Ethibond.

The wound was closed meticulously and Below Knee cast in 15 degrees of equinus was applied.

Figure 6: Harvested Graft



Post-operative management

The wound if soaked was opened via a window in the cast. Dressing was done.

Suture removal done on day 21

Immobilization continued in below knee cast for 6 weeks followed by heel raise for another 6 weeks

Full return to activity resumed at three months post-op

Figure 7 : closed wound with below knee cast



Results

The observations of my study were as follows

- The total number of subjects in the study was 10 out of which 7 were males and 3 were females.
- The age group of patients ranged from 27-54yrs with the average age being 43.2 years.
- The duration of the injury was ranging from 3 months to upto 10 months old with the average time duration being 6 months from injury to time of presentation.
- The defect gap measured ranging from 3 cm to 5 cm with an average of 4 cm.
- The pre-operative MOXFQ score was an average of 80.9 points and post-operative MOXFQ score was on an average of 26.9 points showing a significant improvement of 54 points.
- The outcome was graded according to the MOXFQ (Manchester-Oxford Foot Questionnaire) which showed satisfactory outcome in 8 out of 10 patients.
- Return to normal activity seen in 8 patients at three months and one patient at 8 months
- Complications : Superficial infection seen in one patient treated promptly with debridement and intra-venous antibiotics.
- Failure : One patient had persistent Thompson test and Heel raise test positivity at six months requiring re-exploration and revision surgery.

MASTER CHART

SR NO	AGE	SEX	SIDE	GAP AT SITE OF TEAR (IN CMS)	DURATION OF TEAR (IN MONTHS)	PRE-OP SCORE (MOXFQ1)	POST OP SCORE (MOXFQ AT 6 MONTHS F/U)	COMPLICATIONS	RESULT
1	49	M	R	3	3	76.5	31.3	NIL	GOOD
2	32	M	R	5	4	84.3	21.9	NIL	GOOD
3	45	M	L	4	8	75	43.8	SUPERFICIAL INFECTION	FAIR
4	27	F	L	3	5	81.3	31.6	NIL	GOOD
5	54	M	R	4	7	71.9	15.6	NIL	GOOD
6	46	M	L	3	9	90.7	12.5	NIL	GOOD
7	37	F	R	4	6	87.5	9.4	NIL	GOOD
8	51	M	R	5	10	93.8	71.9	FAILURE	POOR
9	45	M	R	5	5	71.9	18.8	NIL	GOOD
10	46	F	L	4	3	76.5	12.5	NIL	GOOD

Discussion : This study reports our experience and outcome of FHL transfer performed in 10 cases of TA chronic rupture with a 6 to 8 months follow-up. Functional outcome improved significantly as assessed by the mean MOXFQ score increment of 54 points at 6 month follow-up. In our series, all patients presented with a loss of active range of motion of the hallux interphalangeal joint. Despite this, none of the patients reported functional weakness of the hallux during athletic or daily life activity. No hyperextension of the hallux interphalangeal joint occurred. For functional outcome, our results were close to those reported by other authors.^{5,6,7}

Compared to PB or FDL, the FHL is a stronger plantar flexor; its axis of contractile force more closely reproduces that of the AT, it fires in phase with the gastrocnemius-soleus complex, and its anatomical proximity avoids the neurovascular bundle. Another benefit of FHL transfer is the plantar flexion strength reinforcement which is almost always compromised with fascial advancement alone.⁸ With regards to vascularisation of AT, the FHL muscle belly

extends distally into the avascular zone of AT and allows recruitment of an increased blood supply to the repaired AT. Furthermore, FHL transfer maintains the normal muscle balance of the ankle by transferring a muscle with the same function. In a recent study using MRI evaluation, Hahn et al. showed a complete integration of the FHL tendon in 60% of the patients. The FHL was free of degeneration in all patients, and hypertrophy of the FHL of more than 15% was observed in 80% of the patients. This hypertrophy of the FHL muscle suggests functional incorporation into plantar flexion after the transfer.⁹

The potential morbidity of FHL harvesting is essentially the loss of hallux interphalangeal plantar flexion strength. According to our results and those of other studies, FHL transfer morbidity is clinically insignificant, even for good push-off or balance in running sports.⁷ Therefore, alternatives to FHL such as FDL or PB appear less advantageous in these respects. Taking into account all surgical procedures, the incidence of AT re-rupture following acute or chronic rupture reconstruction has been reported to be 1.4–3.7%

^{10, 11} However, in our study and other previous series, when using FHL tendon transfer for AT chronic rupture reconstruction, no case of re-rupture has been reported at latest follow-up.^{5,6,7}

The main limitation of our series is the small number of patients included. However, this series of 10 patients was one of the largest on FHL transfer in this specific indication of chronic AT rupture and the average follow-up at 6 to 8 months was in the literature.

Conclusion : In conclusion, for chronic or neglected AT rupture with a gap of at least 5 cm, surgical repair using a modified FHL transfer with fibrous AT stump reinforcement achieved excellent outcome at our latest follow-up. Reconstruction of Tendo-Achilles using FHL auto-graft has an initial learning curve. The challenges include harvesting the FHL graft from the Knot of Henry and skin closure under tension. Though there is some amount of first great toe weakness, the power of Tendo-Achilles is significantly restored. Satisfactory patient outcome guides us for selecting this procedure as the procedure of choice in chronic tears. Hence it is safe to say that in chronic tears of the Tendo-Achilles, reconstruction is a much more favourable option compared to repair. Post-operative care and rehabilitation are as important as the operative intervention itself.

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