

Functional Outcome of Flexor Hallucis Longus Tendon Grafting in Late Presenting Tendo Achilles Tear at a Tertiary Care Hospital of Nepal

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ABSTRACT

Introduction

Flexor hallucis longus (FHL) tendon augmentation in late presenting Tendo Achilles (TA) tear gives good patient satisfaction. This study aims to analyze the functional outcome of FHL use in TA tear in our setting.

Methods

A retrospective observational study was conducted at National Trauma Center, Nepal of all the cases of FHL use in TA tears during the last one year. The data were collected from the hospital records and functional outcome assessed at the follow up visit of 6 months. Statistical analyses were performed using SPSS 24. The central tendency was represented with median with Interquartile range (IQR) and mean and standard deviation (SD) were used. To compare the means and median, paired t-test and Wilcoxon ranked-sum test were used, respectively. The p-value less than 0.05 was considered statistically significant.

Results

Total 30 cases were included in the study. The mean age was 52.27 + 5.32 years. The mean duration to surgery from injury was 9.53 + 4.13 weeks. The mean tear gap preoperatively was 3.02 + 0.69 cm, which after debridement increased to 3.88 + 0.45 cm. The median total AOFOS score preoperative was 48 (IQR 10) which increased to 82 (IQR 3), which was statistically significant, $p < 0.001$. Post-operatively, 29 (96.67%) cases had good and 1 (3.33%) case had excellent outcome. The most common complaints of the patient were pain post-operatively in 22 (73.33%) cases, followed by ankle weakness in 19 (63.33%) cases.

Conclusion

The flexor hallucis longus tendon augmentation in late presenting Tendo Achilles tear gives good functional outcome. But most patients complained of pain and weakness post-operatively.

Keywords

Achilles tendon; injury; tear; treatment outcome.

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INTRODUCTION

Late presenting Tendo Achilles (TA) tear and ones having gap 3-6 cm have a viable option of repair with local tendon transfer.¹ The flexor hallucis longus (FHL) is commonly used for the reconstruction nowadays.² The anatomical proximity, synergistic actions and acceptable donor site morbidity has made this tendon preferred as the graft in TA tears.³

The patient satisfaction after the augmentation with the FHL in these tears reached 86%.² The case had improved functional outcome by 33.4 points and 79% returned to previous level of activities.¹ The Visual analogue scale (VAS) for pain also decreased to 1.85 from preoperative 7.77 at two years follow up.⁴

Despite its global acceptance, the countries like Nepal have less literature on the assessment on the functional outcomes. This study aims to observe the short-term functional outcome of FHL use in TA tears.

METHODS

A retrospective observational study was conducted at National Trauma Center, Mahankal, Kathmandu, Nepal. The data of all the patients who were treated at the study center with FHL for TA tear within the period of 1 year (2023-2024) having at least 6 months postoperative period since the index surgery were collected. The cases with either traumatic or degenerative tears were included. Participants lacking the contact details, with incomplete records, or those with lost to follow ups were excluded from the study. The ethical clearance was obtained from Institutional Review Board (IRC) of National Academy of Medical Sciences (NAMS) (Ref no. 309/2081/82) dated 26 September 2024. The purposive sampling was employed.

The informed consent was obtained at the follow up from the patient. The age, sex, time since injury, mechanism of injury, side of involvement, and gap in TA were collected from the hospital records. The preoperative American Orthopaedic Foot and Ankle Society Score or Scale (AOFOS) ankle hindfoot score was obtained retrospectively from the patients and its post operative score was recorded during the follow up visits.⁵ The surgery was carried out under thigh tourniquet application. A posteromedial incision was used to expose the ruptured TA. The gastrosoleus along with TA was exposed proximally, and the incision extended distally

over the superior part of the calcaneum. The TA stump was debrided and the final gap measured. A medial plantar incision is made to expose the Flexor Hallucis Longus(FHL) and Flexor Digitorum Longus(FDL) tendons at the Knot of Henry. The FHL tendon is detached as distally as possible and delivered through the proximal incision. A tunnel was made in the calcaneum near the insertion of the Achilles tendon in a superior-medial to plantar-lateral direction, using a reamer. The FHL tendon was then fixed in the tunnel with the ankle in a neutral position using bioabsorbable interference screws to secure fixation. The belly of the FHL tendon was sutured to the gastrosoleus and proximal part of the Achilles tendon. Wound was closed in layers. Ankle was maintained in plantar flexion with an anterior slab. Suture was removed on 14th days. Weight bearing till pain tolerated after slab removal, TA strengthening exercises, and ankle range of motion was started from the 4th week.

The data were first filled in the proforma which was later entered on MS Excel 2016. Statistical analyses were performed using IBM SPSS Statistics, version 24(IBM Corp., Armonk, NY, USA). For the description of the data, percentage were used. The central tendency was represented with median with Interquartile range (IQR) for the ordinal data, and for continuous data mean and standard deviation(SD) was used. To compare the means and median of paired data, paired sample t-test and Wilcoxon ranked-sum test were used respectively. The p-value less than 0.05 was considered statistically significant.

RESULTS

There were total of 32 cases during the study period. However, two cases could not be contacted. Hence, 30 cases were included and analyzed in the study. The mean age was 52.27 ± 5.32 years, with range of 43 to 61 years of age. Eighteen (60%) were males and 12(40%) were females. All(100%) of the cases had the history of fall injury. The cases were operated at the mean duration of 9.53 ± 4.13 weeks after the injury. The right-side involvement was in 24(80%) cases and left in 6(20%) cases.

The mean tear gap diagnosed on USG preoperatively was 3.02 ± 0.69 cm, which after debridement intraoperatively increased to 3.88 ± 0.45 cm. The paired sample t-test showed statistically significant increase in the gap ($t = -7.9$; 95% CI: -1.09 to -0.64, $p < 0.001$).

Table 1. The change in Ankle hindfoot American Orthopedic Foot and Ankle Society (AOFOS) pre-operative vs the post-operative

Variables	Median (IQR)		Z value [§]	p-value [§]
	Preoperative	Postoperative		
Pain (40 points)	20 (0)	30 (0)	-5.06	<0.001*
Function (50 points)				
-Activity limitations	4 (0)	7 (3)	4.85	<0.001*
-Maximum walking distance, blocks	2 (2)	5(1)	-4.60	<0.001*
-Walking surfaces	3(1)	5(2)	-4.59	<0.001*
-Gait abnormality	4(0)	8(0)	-5.14	<0.001*
-Sagittal motion (flexion plus extension)	4(0)	8(0)	-5.19	<0.001*
-Hindfoot motion (inversion plus eversion)	3(0)	6(0)	-4.89	<0.001*
-Ankle-hindfoot stability (antero-posterior, valgus-varus)	4(8)	8(0)	-3.87	<0.001*
Alignment (10 points)	5(0)	5(1)	-2.64	0.008*
AOFOS score (100 points)	48(10)	82(3)	-4.79	<0.001*

§-Wilcoxon signed-rank test for paired samples

*-statistically significant

All the individual categories in AOFOS score were statistically different with the post-operative value higher than preoperative value signifying the improvement. The median total AOFOS score preoperative was 48 which increased to 82, which was statistically significant, $p < 0.001$. (Table 1) All the preoperative AOFOS score had poor

rating which increased in postoperative to 29(96.67%) having good and 1(3.33%) with excellent outcome. The most common complaints of the patient were pain post-operatively in 22(73.33%) cases, followed by ankle weakness in 19 (63.33%) cases. The wound infection was present in 2(6.67%) cases which was superficial and later subsided with regular dressing. (Table 2)

Table 2. The complications experiences by the patients. (percentage of total)

Complications	n(%)
Pain	22 (73.33)
Weakness	19 (63.33)
Wound infections	2 (6.67)

DISCUSSION

The augmentation of TA tears with FHL achieved good functional outcome with less complications reported. The post-operative AOFOS score improved to 82 from pre-operative 48 points, which was statistically significant change. Two (6.67%) patients had wound infection which later improved.

The mean age was 52.27 ± 5.32 years, representing the middle-aged to older adult population. In other similar studies the reported age is comparable to our study.^{2,6,7} This may be due to degeneration of tendon causing increased risk of tear.

The mean time from injury to surgery was 9.53 ± 4.13 weeks in this study. When no treatment is instituted after four weeks the torn tendon retract with the fibrous tissue filling the gap giving rise to chronic tears.^{6,8} These kinds of gaps more than two centimeters, will not be repaired with primary suture alone and needs augmentation with grafts.⁸ The FHL is near to the TA tear site, has synergistic functions and acceptable donor site morbidity which has increased its use in reconstruction of such tears nowadays.^{2,3,9} A pedobarographic study shows that FHL tendon grafting in TA tears initially decreased the foot peak pressure which was gradually regained and comparable to normal

foot.¹⁰ The FHL shows the hypertrophy which helps in regain of strength.^{7,10} So the FHL may be used in TA tears without affecting the overall later functions.

The functional outcome was assessed using the ankle- hindfoot AOFOS scale in this study. The preoperative median score was 48 (IQR 10) which improved to 82(IQR 3), which was a statistically significant change ($p < 0.001$). The systematic review by Azam et al. in 2023 showed the preoperative AOFOS score of 54.7 enhanced to 90.8 post-operatively.⁹ A comparative meta-analysis showed FHL tendon, hamstring tendon, or turn down flap use yielded comparable AOFOS score improvement.¹¹ With FHL tendon use the improvement was 31.8 points.¹¹ These improvements are comparable to our study. A study done on Indian population also gives the comparable improvement after FHL transfer.³ Use of interference screws assists in correct tensioning of the transferred FHL tendons.¹² A study used Achilles tendon total rupture score (ATRS) to assess the functional outcome in patient and found the improvement of 57.1 points after the surgery at 1 year follow up.¹³ Though our study used different scoring system but it can be substantiated that post operatively chronic TA tears give improved outcomes to the patients. With the use of single incision too the AOFOS score improved.¹⁴ The use of minimally invasive techniques and endoscopic techniques are also evolving which give promising results too.¹⁵⁻¹⁷ A study by Nordenholm et al. in 2022 however reported persistent limitation in function of the ankle and foot at one year follow up but had acceptable capacity.⁶ This highlights the need to further explore the outcomes with rigorous assessment measures. A study by Jadawala et al showed improved AOFOS score with FHL transfer and suggested lesser chances of re-tear.¹⁸ A retrospective study with mean 62 months follow-up showed no cases of re-rupture in FHL augmented TA repair.¹⁹ The FHL augmentation has also been suggested in patients with high performance expectations post-operatively.²⁰

There are several limitations to this study. Due to retrospective design the quality of data could not be ascertained. The AOFOS pre operative was taken retrospectively so introduced recall bias. The sample size is small and it is a single center study, therefore generalization of the

findings may be questionable. The cases were operated by different surgeons of the same hospital. This may have confounded the outcome.

CONCLUSION

The flexor hallucis longus tendon augmentation in late presenting Tendo Achilles tear gives good functional outcome. But most patients complained of pain and weakness post-operatively.

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CONFLICT OF INTEREST

Regarding the research, writing, and/or publication of this work, the author(s) affirm that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

All the authors have reviewed and gave the feedback on the manuscript. The final manuscript was approved by all the authors.

Sudeep Khanal: Research concept, design, literature review, data collection, manuscript preparation, review

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