



FUNCTIONAL OUTCOME OF FLEXOR HALLUCIS LONGUS TRANSFER AUGMENTED WITH GASTROCNEMIOUS TURNDOWN FLAP IN THE RECONSTRUCTION OF CHRONIC ACHILLES TENDON RUPTURE

Orthopaedics

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ABSTRACT

Introduction Chronic spontaneous rupture of Achilles tendon commonly occurs in middle aged and elderly person, which often goes undiagnosed or untreated for long duration, resulting in large gap in between two ruptured ends. Disrupted Tendo Achilles causes weakness in plantar flexion of foot and abnormal gait. Surgical repair of the chronic rupture have poor result due to large gap in between ends. Different surgical procedures are described in the literature for Reconstruction of chronic Tendo Achilles injuries without any clear superior technique. Purpose of this study is assessment of functional outcome of Flexor Hallucis Longus transfer augmented by turn down Gastrocnemius flap in chronic Tendo achilles rupture. **Methods** This study Assessed functional outcome of Chronic achilles tendon rupture, reconstructed by Flexor Hallucis Longus transfer augmented by turndown gastrocnemius flap done at orthopaedics department, Bankura Sammilani medical college between november 2020 to october 2021. Patients were followed up for 12 months and then assessed clinically for range of movement, return to normal mobility, persistence of pain and complications. Functional outcome were assessed by American Orthopaedic Foot and Ankle Society(AOFAS) ankle and hindfoot score and Visual analogue Score (VAS). **Observations** Out of 8 patients, 6 had Excellent AOFAS score of 90 to 100, while 2 patient had a good score of 80 to 89. None had fair or poor score. None of the patients had wound breakdown, ankle stiffness, persistent nerve palsy or rerupture of the reconstructed tendon. Mean VAS score for pain at 12 month follow for 8 patients was 0, as none had any pain complain. None of the patient had any loss of ankle joint movement or stability. All patient resumed there normal day to day activity but none could restart recreational or sporting activity. **Conclusions.** Flexor Hallucis Longus transfer with turndown flap augmentation gives good to excellent outcome with minimal complication, if meticulous soft tissue handling and proper wound closure are done.

KEYWORDS

Chronic Tendo Achilles Rupture, Flexor Hallucis Longus Transfer, Gastrocnemious Turndown Flap

INTRODUCTION-

Achilles tendon is the strongest tendon in the body, which helps in plantar flexion of ankle joint and helps in walking and running by stabilising ankle during Toe off phase of gait. Chronic Tendo Achilles rupture is the chronic spontaneous rupture of Achilles tendon commonly occurring in middle aged and elderly person, which has been undiagnosed or not treated for more than 4 weeks¹, resulting in large gap in between two ruptured ends. Disruption of Tendo achilles gives rise to weakness in plantar flexion of foot and abnormal gait. Surgical repair of chronic Tendo achilles rupture have poor result in comparison to repair of acute tendo Achilles injuries due to large gap in between two end and fibroblastic changes at rupture tendon site. There are different surgical procedures described in the Literatures for Reconstruction of chronic tendo achilles injuries without any clear superior technique².

Purpose of this study is to assess functional outcome of flexor hallucis longus transfer augmented by turn down gastrocnemius flap in chronic tendo achilles rupture done in our institute.

MATERIAL & METHOD-

This study was conducted at Orthopaedics department, Bankura Sammilani medical college, Bankura. Assessment of functional outcome were done in patients of Chronic achilles tendon rupture operated by Flexor Hallucis Longus(FHL) tendon transfer augmented by turndown Gastrocnemius flap, who were operated between november 2020 to october 2021 and who have completed at least 12 months follow up were included in the study. Proper informed consents were obtained from patients before enrolling for the study.

In total 11 patients were operated by this method in this time frame, but 3 patients were lost in follow up. Out of 8 patients, 6 patients were male and 2 were female with mean age of 50.87 years with range of 27 years to 72 years. Mean interval between injury to operation were 11.5 weeks with range of 7 weeks to 18 weeks. Patients were assessed clinically for range of movement, return to normal mobility, persistence of pain and

complications. Functional outcome results were assessed by American Orthopaedic Foot and Ankle Society(AOFAS) ankle and hind foot score and Visual analogue score (VAS) for pain at the end of 12 months of follow up.

Surgical Technique-

Patients were placed at prone position after suitable anaesthesia. Posterior longitudinal incision was given from musculotendinous junction of gastrocnemius to the insertion of achilles tendon, sharp dissection done upto the tendon, sural nerve identified and protected. Debridement of fibrotic scarred tissue at the site of rupture was done, resultant gap was measured.

Flexor Hallucis Longus(FHL) tendon was identified through a second incision at medial aspect of foot and it was cut at that site to be retrieved from proximal incision. Distal cut end of FHL were tenodesed to Flexor digitorum longus(FDL) tendon. Proximal end of FHL was prepared with the help of modified Bunnell suture, a tunnel was prepared from stump of ruptured Achilles tendon to the heel.

FHL tendon then passed through the tunnel and fixed by interfragmentary screw through tunnel prepared. Transferred FHL tendon was then augmented with one 2cm thick turndown flap developed from the middle third of proximal end of gastrocnemius and it was sutured onto FHL tendon and the distal stump. Proximal gap developed due to turn down flap apposed with suture. Paratenon was also sutured covering the reconstructed tendon. Skin incision repaired with monofilament after ensuring proper haemostasis. A posterior plaster of paris (POP) slab applied over the compression bandage in plantar grade position of foot.

POP slab removed 6 weeks after operation and mobilisation of ankle joint was allowed but strict non weight bearing was advised for another 4 weeks. Gradual weight bearing was allowed after about 10 weeks from operation and walking aids were advised till patients were confident enough for independent walking.



Fig 1. Gap between rupture ends



Fig 2. Gap at rupture site after debridement.



Fig 3. Harvesting of FHL tendon



Fig 4. Distal cut end of FHL tenodesed with FDL



Fig 5. Fixation Of FHL tendon with Interferential Screw



Fig 6. Fashioning of gastrocnemius turnaround flap



Fig 7. Augmentation of FHL transfer with gastrocnemius turnaround flap



Fig 8. Position of interferential screw on xray

Observations-

Out of 8 patients 4 had achilles tendon rupture on right leg and 4 had rupture on left leg. The mean Gap at rupture site measured with help of ultra sonogram was 3.6 cm with range of 2cm to 5cm. While post debridement gap measured at the time of operation had a range of 4.2cm to 7.8 cm with mean of 6 cm.

None of the patients had wound breakdown, ankle stiffness, persistent nerve palsy or rerupture of the reconstructed tendon. Though 2 patient had developed numbness over heel region which was resolved after

about 3 month. 3 patients also complained of initial pain at the incision site of pull through suture for FHL tendon over heel , which also resolved over time. Mean VAS score for pain at 12 month Follow-up for 8 patients was 0 as none had any pain complain.

AOFAS score of 8 patients completing 12 month of follow up were 88,88,92,92,92,94,94,96,97 respectively with a mean of 92.63 . Out of 8 patients 6 had Excellent AOFAS score of 90 to 100, while 2 patient had a good score of 80 to 89. None had fair or poor score. None of the patient had any loss of ankle joint movement or stability, though 2 patient with good result had obvious gait abnormality and 4 patients had some difficulty in walking on uneven surface and climbing stairs. All patient resumed there normal day to day activity but none could restart recreational or sporting activity.

DISCUSSION

Chronic Achilles tendon rupture develops a gap between two ruptured ends filled up with bridging scarred tissue. Conservative treatment may allow mobilisation with shoe aids but there is always some ankle instability and difficulty in walking specially at toe off phase of gait. For proper end to end healing by surgical treatment needs debridement of the scarred and fibrosed tissue , making it difficult to do a end to end anastomosis. So V-Y tendon lengthening⁷ , tendon flaps and augmentation were popularised .

Different tendon transfer were advised for chronic Achilles tendon rupture as either primary procedure or for augmentation. Perez-Teuffer used Peronius brevis in 1974, whereas Mann et al⁴ described FDL transfer in 1991 . Same year Hansen⁵ and Wapner et al⁶ used FHL for the purpose, while Hansen⁵ harvested the tendon from same incision , Wapner et al⁶ used separate medial foot incision to harvest the tendon . Several other authors used allografts and synthetic grafts to avoid donor site morbidity and reduce operative time.

FHL is better over other tendons as it is a strong plantar flexor , have very near anatomical line of pull to Achilles tendon , have a same phasic contraction to gastro soleus complex and minimises Chances of neurovascular injury due to close proximity to Achilles tendon. Only concern is loss off great toe plantar flexion which can be compensated by tenodesis of FHL tendon cut end to FDL tendon.

Turndown flaps are another method to bridge the gap between ruptured ends , popular due to easy harvesting procedure, easy availability and general good result. Christensen first described single central turndown flap in 1953, whereas Arner and Lindholm described 2 peripheral turndown flaps in 1959⁷.

Combination of FHL tendon transfer with turndown flap further augments the reconstruction procedure and helps in better rehabilitation. Though too much bulkiness of the reconstruct may make it difficult for wound closure ,leading to wound dehiscence .It needs meticulous soft tissue handling, coverage of paratenon over turndown flap,proper layered wound closer helps in wound healing and avoids wound dehiscence.

Overall we have a good to excellent result with minimum complication. But as it is single center study with very few cases with only 12 months of follow up, it is premature to conclude about its effectiveness.

JirunApinun et al⁸ on their meta-analysis of comparison between FHL transfer and FHL transfer with augmentation concluded FHL transfer with augmentation have better result and lesser complication than only FHL transfer.

Don Koh et al⁹ on a similar study concluded FHL is reliable and effective procedure for Achilles tendon reconstruction. They also found only FHL transfer takes Significantly lesser operative time in comparison to FHL transfer with turndown flap and both have comparable result.

Darren Tay et al¹⁰ on their two year follow up of two turn down flaps augmented by FHL transfer have satisfactory result with low morbidity. Kyle S Peterson et al¹¹ also showed success in cases of chronic tendo achilles rupture treated with FHL transfer with gastrocnemius turnaround flap augmentation.

CONCLUSIONS.

A Chronic Achilles tendon rupture is difficult to treat conservatively

due to gap at rupture site filled with scarred tissue formation .FHL transfer with turndown flap augmentation gives good to excellent outcome with minimal complication ,if meticulous soft tissue handling and proper wound closure were done.

Conflict of interest- Nil.

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