

Case Report

Closed atraumatic flexor hallucis longus tendon rupture following hallux valgus correction repaired using a turn down flap

Abhinav Nair, Rajkumar Sundarapandian*, Nisha Nadar, Anand Pillai

Trauma and Orthopaedics, Wythenshawe Hospital, Manchester, United Kingdom

Received: 04 February 2023

Revised: 04 March 2023

Accepted: 09 March 2023

*Correspondence:

Rajkumar Sundarapandian,

E-mail: rajkumar.jayachandran@mft.nhs.uk

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

A case report of closed atraumatic rupture of flexor hallucis longus (FHL) tendon few months after hallux valgus correction in a high functioning individual is presented. There have been only two cases of FHL tendon rupture reported following hallux valgus correction in literature till now. Our patient underwent Hallux valgus corrective osteotomy, 4 months after which he presented with rupture of the FHL tendon, he subsequently underwent successful surgical turn down flap repair with good clinical outcome. Closed atraumatic rupture of FHL tendon as an isolated injury is a rare event evidenced by systematic review reporting only 10 cases in literature till now. Low clinical suspicion of FHL rupture in closed foot injuries could be one factor resulting in fewer cases being reported in literature. Acute rupture of FHL tendon following open foot injuries and partial closed rupture due to tendinitis in dancers have been reported frequently in literature. In conclusion, we emphasize careful handling of FHL tendon while performing corrective osteotomy of the hallux in any patient. Although, turn down flap is a well-documented technique to bridge gaps and repair chronic tendo-achilles rupture, we were able to replicate the same technique in our patient and produce good functional result using this effective tendon repair technique to bridge segmental gap as evidence by return of almost normal power of great toe plantar flexion.

Keywords: Flexor hallucis longus tendon rupture, Turn down flap repair, MOXFQ score

INTRODUCTION

We present a rare case report of closed atraumatic rupture of flexor hallucis longus (FHL) tendon few months after hallux valgus correction in a high functioning individual. There have been only two cases of FHL tendon rupture reported following hallux valgus correction in literature till now.^{13,14} Acute rupture of FHL tendon following open foot injuries and partial closed rupture due to tendinitis in dancers have been reported frequently in literature.^{1,2}

Closed atraumatic rupture of FHL tendon as an isolated injury is a rare event evidenced by systematic review reporting only 10 cases in literature till now.³ Low clinical suspicion of FHL rupture in closed foot injuries could be

one factor resulting in fewer cases being reported in literature.⁴

CASE REPORT

We have obtained informed consent from the patient to write this case report and for academic use of intra-operative photographs.

A 43 year old gentleman presented to the Foot and Ankle clinic in June 2021 with several years history of right sided forefoot pain at the ball of his foot and right sided Hallux valgus deformity. He was a fit and muscular individual who regularly practises martial arts at the gym. He was tender on palpation of the lateral sesamoid and reported

pain on resisted dorsiflexion of great toe. Weight bearing X-rays of the foot measured hallux valgus angle of 32 degrees and intermetatarsal angle of 21 degrees. He underwent Hallux valgus corrective osteotomy with Chevron and Akin along with lateral soft tissue release in August 2021. He remained on heel weightbearing for the first six weeks after surgery and then gradually progressed into full weightbearing. Post-operative radiographs showed good correction, union and alignment of the great toe.

He presented again to our clinic 4 months after surgery with ongoing pain at the ball of his forefoot under the right great toe and inability to flex the great toe. There was tenderness over the 1st metatarsophalangeal joint (MTPJ) and along the 1st metatarsal shaft. He was unable to actively plantar flex the right great toe. Ultrasound and MR scan of the right foot confirmed rupture of the FHL tendon at the level of 1st metatarsophalangeal joint with retraction of stump to the middle of 1st metatarsal shaft. There was an incidental finding of a hyperintense benign appearing soft tissue mass proximal to the 1st metatarsophalangeal joint.

He was taken up for open surgical repair of the ruptured FHL tendon using a longitudinal plantar incision along the lateral border of 1st metatarsal (Figure 1). Proximal stump of ruptured FHL tendon was found retracted along the 1st metatarsal shaft (Figure 2). A soft, benign appearing mass measuring about 2×1 cm was found proximal to 1st metatarsophalangeal joint (Figure 3). This mass was excised, and histopathological study later confirmed it to be a benign Schwannoma. Proximal and distal stumps of the ruptured tendon identified and debrided. Distance between the cut ends of tendon measured around 4 cm (Figure 4). We decided on a turndown flap technique using proximal stump to bridge the segmental gap between tendon ends. Proximal stump was divided along its thickness to lift a flap measuring around 4 cm and base of the flap was sutured to prevent further extension.

End of the turn down flap was then sutured to the distal stump with adequate tension (Figure 5). K-wire was used to stabilize the 1st metatarsophalangeal joint and below knee plaster cast was applied at the end of the procedure. Patient remained non-weightbearing on right foot for 4 weeks following surgery, after which K-wire was removed and weightbearing commenced gradually. Patient was reviewed in clinic four months after surgery and reported complete resolution of pain under the ball of his foot. He was able to actively plantarflex the great toe but reported some stiffness and difficulty in tip toeing. Power of plantar flexion of the great toe was 4/5 with good palpable excursion of the FHL tendon. Plantar flexion of the great toe was terminally stiff in both active and passive movements. Patient was almost at his baseline function and was able to do light jogging on the treadmill. He had not resumed intense activities such as martial arts at the time of clinic review. His MOXFQ score at the last clinic visit were walking/standing- 42.8, pain- 40 and social

interaction- 30. The MOXFQ summary index score was 38.7.

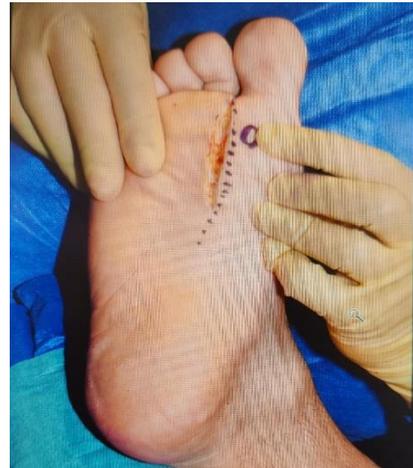


Figure 1: Plantar incision along the lateral border of 1st metatarsal.



Figure 2: Ruptured FHL tendon.



Figure 3: Soft tissue mass near 1st metatarsophalangeal joint.

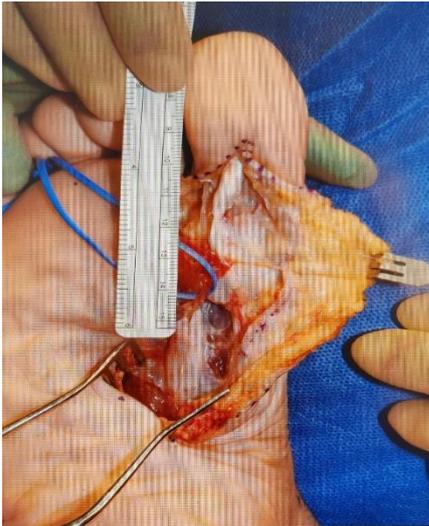


Figure 4: Distance between cut ends of the tendon was 4 cm.



Figure 5: Turn down flap repair of FHL tendon.

DISCUSSION

Prevalence of FHL tendon rupture due to destructive synovial inflammation in patients with Rheumatoid arthritis has been well documented.^{5,6} Literature evidence of rupture of FHL tendon rupture in non-rheumatoid individuals is rare and usually attributed to dancers and high functioning athletes.^{1,2} Closed atraumatic rupture of FHL tendon as an isolated injury is a rare event evidenced by systematic review reporting only 10 cases in literature till now. Low clinical suspicion of FHL rupture in closed foot injuries could be one factor resulting in fewer cases being reported in literature.⁴ A commonly postulated hypothesis in these individuals regarding the mechanism of rupture is eccentric contraction of the FHL while forcefully dorsiflexing great toe.⁷ This posture of foot is particularly observed in ballet dancers resulting in partial tears of FHL due to attrition. Chun di et al have observed this common mechanism of rupture in their case report as well as several other published cases.⁸ Our patient was not a professional athlete, but he was a fit and muscular

individual who practised martial arts regularly in the gym. His training involved adoption of this foot posture during workouts and while sparring.

Rupture of FHL tendon in our patient was at the level of 1st metatarsal head which has been observed as a point of lowest resistance in the tendon by Romash et al in their review of literature.⁹ Our patient had a mass lesion at the level of 1st metatarsal head displacing the tendon medially which could have made it more vulnerable to handling and injury while he underwent osteotomy for correction of Hallux valgus in 2021. This could have perpetuated into a complete rupture as he gradually resumed exercising at the gym after recovering from first surgery. Brand et al have reported a similar case report where they suspected FHL tendon could have sustained partial laceration during hallux valgus correction in their patient and progressed to a complete tear.¹³

Romash et al have also observed the distinct difference in a closed atraumatic tendon rupture versus an open laceration.⁹ Closed atraumatic ruptures such as our patient results due to tensile failure of the tendon leading to disruption of surrounding soft tissue and retraction of tendon making it impossible to restore length with acute end to end repair. Indication for surgery in these injuries would be to reduce pain and re-establish hallux purchase which is essential as the last step in toe off during gait.¹⁰ Hence, surgery to repair torn FHL tendon is considered vital in all cases to avoid gait imbalance.¹¹ Gilliot et al in a similar case report have highlighted the implications of FHL rupture proximal to and distal to the Knot of Henry.¹⁴ FHL and FDL have interconnections and if the rupture is proximal to knot of Henry, the mass action of FDL will compensate and aid in plantar flexion of great toe. On the other hand, if the rupture is distal to knot of Henry such as our case then plantar flexion of great toe is lost necessitating a surgical repair.

We used a plantar approach to repair the tendon as well as excise the soft tissue mass near 1st MTPJ. A plantar incision slightly lateral to 1st metatarsal helps avoid surgical wound under the weightbearing region of 1st MTPJ. A full thickness flap was raised, and digital nerves were identified to be tagged as shown in the photographs. A few different repair techniques such as end to end repair, tendon transfer or tenodesis to flexor digitorum longus have all been described to address this injury.¹² We performed a turn down flap technique using proximal stump to bridge the gap and repair the tendon. Turn down flap is a well-documented technique to bridge gaps and repair chronic tendoachilles rupture.^{15,16} We were able to replicate the same technique in our patient and produce good functional result as evidence by return of almost normal power of great toe plantar flexion and ability of the patient to return to running on treadmill after surgery without any discomfort. The MOXFQ score was improved at the last clinic follow-up when compared to the pre-operative score which was more than 90.

CONCLUSION

We presented a rare case report of FHL tendon rupture following hallux valgus correction in an athletic individual. We emphasize careful handling of FHL tendon while performing corrective osteotomy of the hallux in any patient. It is important to consider FHL repair in all ruptures distal to knot of Henry due to lack of compensation from FDL and turn down flap is an effective tendon repair technique to bridge segmental gap and produce good clinical outcome in these patients.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

1. Sammarco GJ, Cooper PS. Flexor hallucis longus tendon injury in dancers and nondancers. *Foot Ankle Int.* 1998;19(6):356-62.
2. Sammarco GJ, Miller EH. Partial rupture of the flexor hallucis longus tendon in classical ballet dancers: two case reports. *J Bone Joint Surg Am.* 1979;61(1):149-50.
3. Kerr DL, Butler S, Thompson K, Higgs A. Complete rupture of the flexor hallucis longus tendon in an isolated closed injury. A systematic literature and qualitative analysis. *Mus Lig Tend J.* 2019;9(1).
4. Grispigni C, De Ponti A, Danasini P, Sarto L. Closed subcutaneous rupture of the flexor hallucis longus tendon. Case report and review of the literature. *J Orthop Traumatol.* 2000;1(2):107-10.
5. Baan H, Drossaers-Bakkers WK, Dubbeldam R, Buurke JJ, Nene A, Laar MA. Flexor Hallucis Longus tendon rupture in RA-patients is associated with MTP 1 damage and pes planus. *BMC Musculoskelet Disord.* 2007;8:110.
6. Maillefert JF, Dardel P, Cherasse A, Mistrih R, Krause D, Tavernier C. Magnetic resonance imaging in the assessment of synovial inflammation of the hindfoot in patients with rheumatoid arthritis and other polyarthritis. *Eur J Radiol.* 2003;47(1):1-5.
7. Souza LJ, Rutledge E. Closed Rupture of the Flexor Hallucis Longus Tendon with Evaluation of the Mechanism of Injury: A Case Report. *JBJS Case Connect.* 2014;4(2):e45.
8. Chun DI, Lee HS, Won SH, Moon SI, Jung KJ, Seo JH, et al. Closed atraumatic complete rupture of the flexor hallucis longus tendon during forward lunge exercise: A case report. *Medicine (Baltimore).* 2019;98(50):e18409.
9. Romash MM. Closed rupture of the flexor hallucis longus tendon in a long distance runner: report of a case and review of the literature. *Foot Ankle Int.* 1994;15(8):433-6.
10. Wei SY, Kneeland JB, Okereke E. Complete atraumatic rupture of the flexor hallucis longus tendon: a case report and review of the literature. *Foot Ankle Int.* 1998;19(7):472-4.
11. Anastasopoulos N, Paraskevas G, Lazaridis N, Natsis K. Reconstruction of Neglected Flexor Hallucis Longus Tendon Rupture: A Case Report. *J Foot Ankle Surg.* 2018;57(6):1256-8.
12. Drake R, Vogl AW, Mitchell AWM. *Gray's Anatomy for Students.* New York: Elsevier Health Sci; 2009.
13. Brand JC, Smith RW. Rupture of the flexor hallucis longus after hallux valgus surgery: case report and comments on technique for adductor release. *Foot Ankle.* 1991;11(6):407-10.
14. Gillott E, Ray PS. Repair of iatrogenic rupture of the flexor hallucis longus tendon following an Akin osteotomy: a case report and review of literature. *Foot Ankle Online J.* 2012;5(1).
15. Demirel M, Turhan E, Dereboy F, Yazar T. Augmented repair of acute tendo Achilles ruptures with gastrosoleus turn down flap. *Indian J Orthop.* 2011;45(1):45-52.
16. Mahipathy SR, Durairaj AR, Sundaramurthy N, Jayachandiran AP, Rajendran S. Tendoachilles reconstruction by a gastrosoleus turn-down flap: a case report. *Int Surg J.* 2021;8(11):3467-71.

Cite this article as: Nair A, Sundarapandian R, Nadar N, Pillai A. Closed atraumatic flexor hallucis longus tendon rupture following hallux valgus correction repaired using a turn down flap. *Int J Res Orthop* 2023;9:616-9.