



Reconstruction of chronic post-traumatic extensor pollicis longus tendon rupture with autogenous tensor fascia Lata: A case report

¹Dr. Sudhir K. Rawat, ²Dr. Shubham Arora, ³Dr. Harsh Patel, ⁴Dr. Akhil Bansal, ⁵Dr. Bhavya Sheth

¹Professor & Head of Unit, Department of Orthopaedics, Dhiraj Hospital, Smt. BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India

²2nd year Resident Doctor, Department of Orthopaedics, Dhiraj Hospital, Smt. BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India

³2nd year Resident Doctor, Department of Orthopaedics, Dhiraj Hospital, Smt. BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India

⁴3rd year Resident Doctor, Department of Orthopaedics, Dhiraj Hospital, Smt. BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India

⁵3rd year Resident, Unit 3, Department of Orthopaedics, Dhiraj Hospital, Smt. BK Shah Medical Institute & Research Centre, Sumandeep Vidyapeeth, Piparia, Vadodara, Gujarat, India

Corresponding Author: Dr. Shubham Arora
Email: shubhamarora213@gmail.com

Abstract

Aims and Objectives: To evaluate functional and clinical outcomes achieved by Autogenous Tensor Fascia Lata Graft in Case of Post Traumatic Extensor Pollicis Longus tendon rupture.

Introduction: Reconstruction of extensor pollicis longus tendon injuries have been reported using the extensor indices proprius. It is believed to be gold standard for this reconstruction. However, this may decrease extension strength and independent extension of the index finger. Also using this graft where the distance between the proximal and the distal fragment of EPL is more has resulted in unfavorable outcomes. We recognized that reconstruction of EPL with tensor fascia Lata graft would achieve functional motion of the thumb and avoid donor site morbidity. Systemic inflammatory diseases, bony ridges, presence of bone plate or external

fixator pin may precipitate this. That occurs due to occupation like cooking, cow milking, tailoring and direct trauma.

Materials and Methods: In this study, a 55-year-old female housewife had a history of trauma resulting in distal end of radius fracture after which she developed rupture of extensor pollicis longus which was confirmed by Sonography and a myotendinous gap of 3.3 cm was found. She had undergone a tensor fascia Lata tendon transfer and Tension was set by extension of thumb and neutral position of the wrist. Stitches removed after 2 weeks. Patient was given cast for 4 weeks to immobilize thumb and wrist movement followed by intermittent splinting and physiotherapy for another 4 weeks to yield excellent result.

Discussion: EPL tear are managed by transposition of extensor indices proprius (EIP) tendon in most of study authors. It is less invasive procedure with beneficial outcomes regarding predictable function of thumb and undisturbed function of the index figure. Interposition TFL tendon grafting was preferred in present case because of increased distance between the proximal and distal tendon fragments. Balance between flexion and extension of thumb is critically obtained by setting tension during graft interposition.

Conclusion: EPL tears most commonly occur at Lister's tubercle. Tears typically occur as a result of trauma to wrist but may also occur spontaneously. EPL tears may occur at the distal phalangeal insertion or at a site of laceration uncommonly. The functional outcomes of EPL tear repair with extensor indices and tensor fascia lata have been comparable but when there is increased myotendinous gap the results are to be better with TFL than repair with EIP. Added advantage is there is no loss of function as while taking EIP graft and also the thickness and availability of TFL graft is more as compared to EIP graft. Hence from my study, I propose EIP reconstruction with TFL graft has better functional clinical and functional outcomes.

Keywords: Extensor pollicis longus tear, tensor fascia Lata graft, extensor indicis proprius grafts, palmaris longus graft

Introduction

The middorsal surface of the ulna and the interosseous membrane are where the EPL originates. It then obliquely crosses the forearm and extends to the radial aspect of the wrist.¹ The EPL tendon is located in the third dorsal compartment of the wrist at the level of the distal radius and is protected by the extensor retinaculum. The triangular "anatomical snuffbox" is formed at or around the level of the scaphoid by the extensor pollicis brevis and the EPL. The thumb's distal phalanx's dorsal base is where the EPL insertion is situated.

Thumb extension is fundamental in starting to grip and release with the thumb - index pinch. The EPL is thus used in almost all manual activities.

Chronic rupture of EPL, which is very disabling for the patient, is not amenable to direct suturing because of tendon attrition and muscular retractions.

With a reported prevalence of 0.2-5%^{4,5} rupture of the EPL tendon is most frequently linked to fractures of the distal radius and it normally takes place 6-8 weeks following the fracture.⁶ Nondisplaced distal radial fractures are more commonly related with

EPL tendon ruptures than displaced fractures. In addition, lunate dislocation, steroid injections, wrist movements and underlying chronic inflammation (such as lupus or rheumatoid arthritis) are risk factors for spontaneous EPL tendon ruptures.^{5, 7, 8, 9}

Two main ideas (mechanical and vascular) describe the pathophysiology of spontaneous EPL tendon ruptures. The EPL tendon is kept close to the distal radius by the extensor retinaculum, which is regarded to be a contributing factor in mechanical irritation.^{5, 8}

According to the vascular theory, the EPL tendon contains a zone that is comparatively avascular close to Lister's tubercle and diffusion from the tendon sheath causes tendon sustenance predominantly in this zone. Hematomas in the tendon sheath increase pressure and hinder synovial fluid production, leading to relative localised ischemia and a rupture risk in this section of the EPL tendon.^{5, 6, 8, 11, 12}

Case report

A patient, 55-year-old woman, had experienced trauma six months prior. Six months ago, she underwent surgical intervention (K-wire fixation). Four months after the injury, she was unable to extend her thumb. Its clinical diagnosis is based on the thumb's interphalangeal (IP) joint's continued flexion and inability to extend. On examination locally, the lister's tubercle was felt to be painful, and grip strength was decreased. She has no history of systemic illness or steroid use. USG confirmed the diagnosis. In order to rule out any other potential causes of EPL rupture, the preoperative anaesthetic assessment included measurements of blood rheumatoid factor and serum uric acid levels, both of which were determined to be within normal limits. The patient was explained an explanation of the process and its results.

Under supraclavicular block, one 8 to 10 cm long incision was made from the distal half of the first metacarpal on the lateral side, prolonged up to the carpometacarpal area, and then curved horizontally up to the lister's tubercle. Between ECRB and EPB, a plane was created. The identified endpoints of the EPL had their deteriorated portions removed. Even on dorsiflexion of wrist the distance between the proximal and the distal stumps was 7-8cm. Ipsilateral tensor fascia Lata was cut to about 11 cm in length and grafted in between the ends of the EPL.

The distal and the proximal stump was fixed using Pulvertaft's technique. The thumb's full extension in the wrist's neutral position was used to set the graft tension. Following the closure of the wounds, a cock-up slab was applied, featuring a thumb spica with the thumb extended and abducted. The sutures were removed after the second week, and the slab was maintained for another two weeks. Exercises for the wrist were suggested after 4 weeks including wrist extension and flexion, gradual thumb ROM, thumb adduction and abduction exercises, finger gripping exercises and active finger movement exercises.

The end result at six months demonstrates full wrist movements with only 20 degree thumb flexion restriction. Strengths of the grip and pinch are 80-90% of the usual side which demonstrates excellent results according to Mayo modified wrist score criteria.

Pre-op photos



Fig 1: Pre-operative picture showing inability to extend right thumb

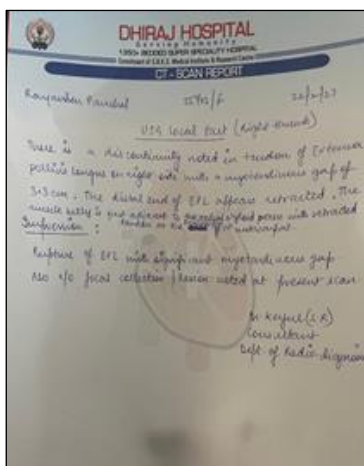


Fig 2: USG reporting showing distance between the proximal and distal stumps (Note made, that intra op the distance between the proximal and distal stump was found to be near 8-9 cm)



Fig 3: USG guided markings for approximate place of distal and proximal stumps

Intra-op photos



Fig 4: Picture showing the proximal and distal degenerated stump of EPL



Fig 5: Harvesting of Tensor fascia lata tendon



Fig 6A,B: Tendon harvesting and harvested tendon



Fig 7A,B: Harvested TFL

Post-Op Photos



Fig 8: 2 Month follow up showing full thumb abduction



Fig 9: 3 Month follow up showing thumb abduction with extension

Discussion

Aside from direct injury, the timing of attrition rupture is poorly characterised in the literature. Engkvist O *et al.* (1979) discovered that it is roughly two months after an undisplaced or minimally displaced fracture of the distal radius near the Lister tubercle and that the incidence of EPL tendon rupture is 0.3 percent following a distal radial fracture ⁷. In the current investigation, rupture occurred after 8 weeks.

Most authors dealt with this problem by inserting the Palmaris longus tendon ⁶⁻⁹. It's a less invasive technique with predictable results. The modified Palmaris longus transfer approach described by Pal *et al.* (2016) is said to give superior results ⁹. According to Kamoi *et al.* (2019) ²⁰, an avascular palmaris longus graft has a higher chance of recurrence and requires two sutures, which produces more adhesions and thumb stiffness. Tendon repair is possible in cases of acute rupture caused by direct trauma.

Extensor indicis proprius, extensor digiti minimi or extensor digitorum communis tendon transfer for little finger and extensor carpi radialis longus tendon transfer are also employed infrequently ⁸. Extensor indicis proprius, according to Matter-Parrat V (2017), is nearly always available and accessible without substantial dissection or major incisions, but it might be a source of morbidity with a subsequent extension deficiency. Exercises for muscle development are also essential. ²¹

In this circumstance, we chose interposition TFL tendon grafting. Despite a 20-degree limitation in thumb flexion, the overall result is good. The approach is less intrusive and produces positive outcomes. Interposition TFL tendon grafting was chosen in this case due to the increasing distance between the proximal and distal tendon portions, as well as the added benefit of being less intrusive and causing no loss of function.

Conclusion

The Lister's tubercle is where EPL tears most frequently occur. Tears can happen naturally, although they usually come from wrist trauma. EPL tears can seldom happen at a site of laceration or at the distal phalangeal insertion. Tensor fascia Lata and extensor indices have produced functional results for EPL tear repair that are equivalent, but when there is a larger myotendinous gap, TFL produces better results than Palmaris longus grafting. Additionally, there is no loss of function as with Palmaris longus grafts, and TFL grafts are more readily available and thicker than EIP grafts. As a result of my research, I contend that TFL grafts used in EPL reconstruction result in improved functional, clinical, and aesthetic outcomes.

References

1. Platzer W. Color Atlas of Human Anatomy: Locomotor System. 6th ed. Thieme, 2008, 1.
2. Clavero JA, Golanó P, Fariñas O, Alomar X, Monill JM, Esplugas M. Extensor mechanism of the fingers: MR imaging-anatomic correlation. Radiographics. 2003;23(3):593-611. Doi: 10.1148/rg.233025079.

3. Timins ME, O'Connell SE, Erickson SJ, Oneson SR. MR imaging of the wrist: normal findings that may simulate disease. *Radiographics*. 1996;16(5):987-995. Doi: 10.1148/radiographics.16.5.8888385.
4. Roth KM, Blazar PE, Earp BE, Han R, Leung A. Incidence of Extensor Pollicis Longus Tendon Rupture After Nondisplaced Distal Radius Fractures. *J Hand Surg Am*. 2012;37(5):942-947. Doi: 10.1016/j.jhsa.2012.02.006.
5. Hu CH, Fufa D, Hsu CC, Lin Y Te, Lin CH. Revisiting spontaneous rupture of the extensor pollicis longus tendon: eight cases without identifiable predisposing factor. *Hand*, 2015. doi:10.1007/s11552-015-9746-y.
6. Gary M Lourie MD, Andrew Putman MD, Taylor Cates MD, Allan E, Peljovich M. Extensor Pollicis Longus Ruptures in Distal Radius Fractures: Clinical and Cadaveric Studies with a New Therapeutic Intervention. *Am J Orthop*. 2015 May;44:209-212.
7. Björkman A, Jörgsholm P. Rupture of the extensor pollicis longus tendon: A study of etiological factors. *Scand J Plast Reconstr Surg Hand Surg*. 2004;38(1):32-35. Doi: 10.1080/02844310310013046.
8. Kim CH. Spontaneous Rupture of the Extensor Pollicis Longus Tendon. *Arch Plast Surg*. 2012;39:680-682. <http://dx.doi.org/10.5999/aps.2012.39.6.680>.
9. Taş S, Balta S, Benlier E. Spontaneous rupture of the extensor pollicis longus tendon due to unusual etiology. *Balkan Med J*. 2014;31(1):105-106. Doi:10.5152/balkanmedj.2013.9027.
10. Wheelless CR, Nunley JA, Urbaniak JR. of Orthopaedic Surgery DUMCD. Wheelless' Online Textbook of Orthopaedics. http://www.wheelsonline.com/ortho/extensor_pollicis_longus_rupture. Published 2017.
11. Engkvist O, Lundborg G. Rupture of the extensor pollicis longus tendon after fracture of the lower end of the radius-A clinical and microangiographic study. *Hand*. 1979;11(1):76-86. Doi: 10.1016/S0072-968X(79)80015-7.
12. Hirasawa Y, Katsumi Y, T Akiyoshi KT, TT. Clinical and Microangiographic Studies on Rupture of the E.P.L. Tendon After Distal Radial Fractures. *J Hand Surg (British)*. 1990;15B(1):51-57.
13. Kim CH. Spontaneous Rupture of the Extensor Pollicis Longus Tendon. *Arch Plast Surg*. 2012;39:680-682. <http://dx.doi.org/10.5999/aps.2012.39.6.680>.
14. Taş S, Balta S, Benlier E. Spontaneous rupture of the extensor pollicis longus tendon due to unusual etiology. *Balkan Med J*. 2014;31(1):105-106. Doi: 10.5152/balkanmedj.2013.9027.
15. Wheelless CR, Nunley JA, Urbaniak JR, of Orthopaedic Surgery DUMCD. Wheelless' Online Textbook of Orthopaedics. http://www.wheelsonline.com/ortho/extensor_pollicis_longus_rupture. Published 2017.
16. Engkvist O, Lundborg G. Rupture of the extensor pollicis longus tendon after fracture of the lower end of the radius-A clinical and microangiographic study. *Hand*. 1979;11(1):76-86. Doi:10.1016/S0072-968X(79)80015-7.

17. Hirasawa Y, Katsumi Y, T Akiyoshi KT, TT. Clinical and Microangiographic Studies on Rupture of the E.P.L. Tendon After Distal Radial Fractures. *J Hand Surg (British)*. 1990;15B(1):51-57.
18. Zheng X, An H, Chen T, Wang H. Effectiveness of modified extensor indicisproprius tendon transfer for reconstruction of spontaneously ruptured extensor pollicislongus tendon. *Zhongguo Xiu Fu Chong JianWaiKeZaZhi*. 2012 Sep;26(9):1074-6.
19. Jung SW, Kim CK, Ahn BW, Kim DH, Kang SH, Kang SS. Standard versus over-tensioning in the transfer of extensor indicisproprius to extensor pollicislongus for chronic rupture of the thumb extensor. *J Plast Reconstr Aesthet Surg*. 2014 Jul;67(7):979-85.
20. Kamoi F, Kondo M, Hayashi M, Uchiyama S, Kato H. A new technique to determine the tension in extensor pollicis longus reconstruction. *J Hand surg Our* 2019;44:790-4.
21. Matter-Parrat V, Prunieres G, Collon S, Facca S. Active extensor indices proprius extension strength after its use as a tendon transfer. 19 cases. *Hand Surg Rehabil*. 2017;36:36-40.