“Extensor Pollicis Longus Rupture Following Volar Locking Plate Fixation of a Distal End Radius Fracture”

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INTRODUCTION

- 1. Distal end radius fractures are among the most frequent injuries treated by orthopaedic surgeons.
- 2. Volar locking plate fixation has become the gold standard for distal end radius fractures.
- 3. However, delayed rupture of the EPL due to oversized distal locking screws remains a known complication, often occurring several weeks postoperatively. Simultaneous attrition of both the EPL and EIP tendons is rare and poorly documented.

CLINICAL RELEVANCE OF EPL

The problem most people have when the EPL tendon ruptures is loss of thumb extension and inability to easily get the hand around things like a glass or a handle. The hand does not open well.

CASE PRESENTATION

- **Chief Complaints** : A 52Y/F came with chief complaints of pain over the left wrist and inability to completely extend her thumb since 1 year
- **HOPI** : Patient was apparently alright 1 year back when she had a fall, impact being on the left wrist for which she underwent ORIF with Volar Plating on 25/5/2024 at DYPH, Pune.

LOCAL EXAMINATION :

INSPECTION :
LEFT WRIST

- 4cm previous surgical scar mark present over the volar aspect of distal forearm

PALPATION : All inspectory findings were confirmed on palpation

- Tenderness present over the dorsal aspect of left wrist

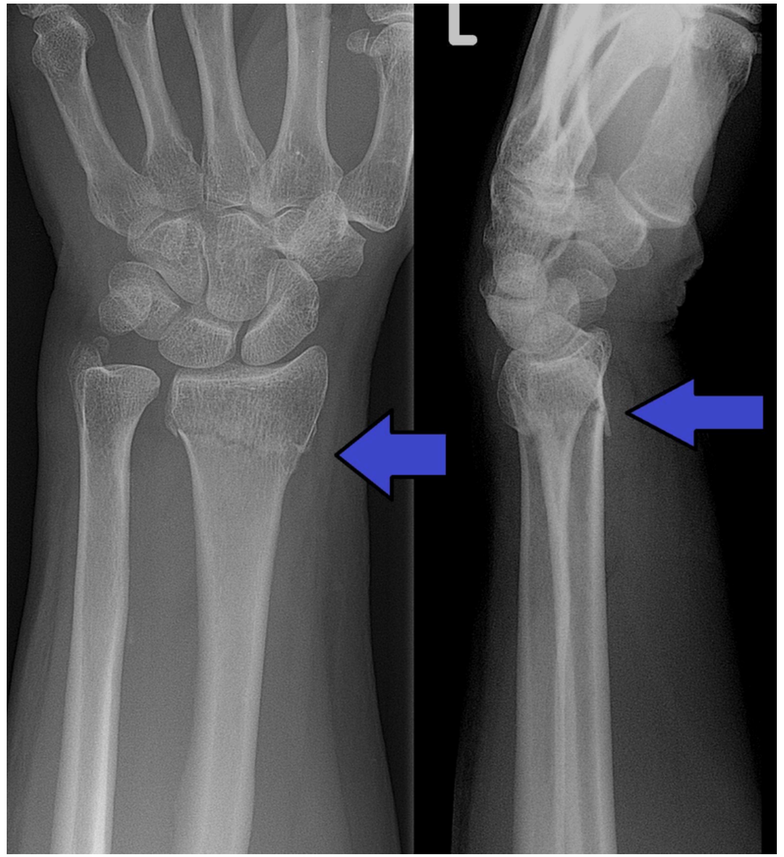
ROM :

	RIGHT	LEFT
MP JOINT EXTENSION.	0-5.	0

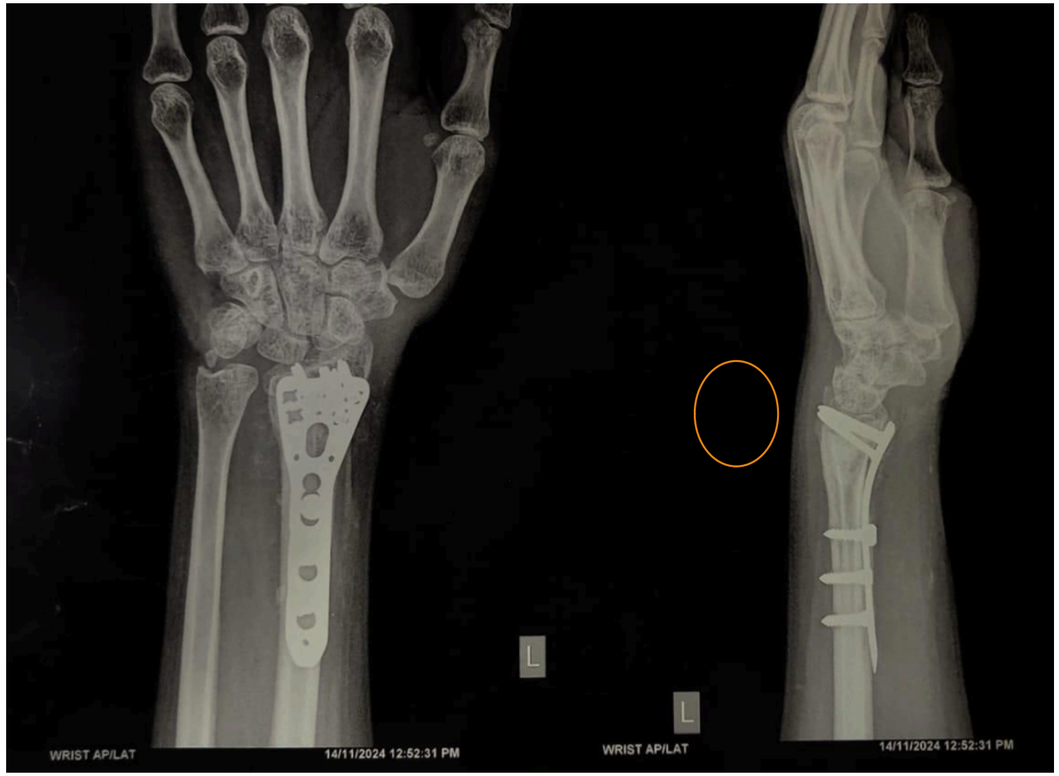
Distal pulses were palpable and no distal neurovascular compromise.

Her intitial recovery was without incident. Approximately 11 months post-surgery, she reported a sudden inability to extend her thumb.
Radiographs at this stage revealed dorsal prominence of screws, suggesting mechanical irritation of extensor tendons.

PRE OP XRAY



PRE OP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OPERATIVE MANAGEMENT

Measurement of the EPL Tendon defect

1.Dorsal approach of wrist was taken and third compartment opened in line with EPL tendon and incision was extended proximally.
2.Attrition of EPL and EIP was observed.
3.On surgical exploration, complete attrition of EPL was observed. Additionally, attrition of EIP tendon (Extensor Indices Proprius) was also noted.

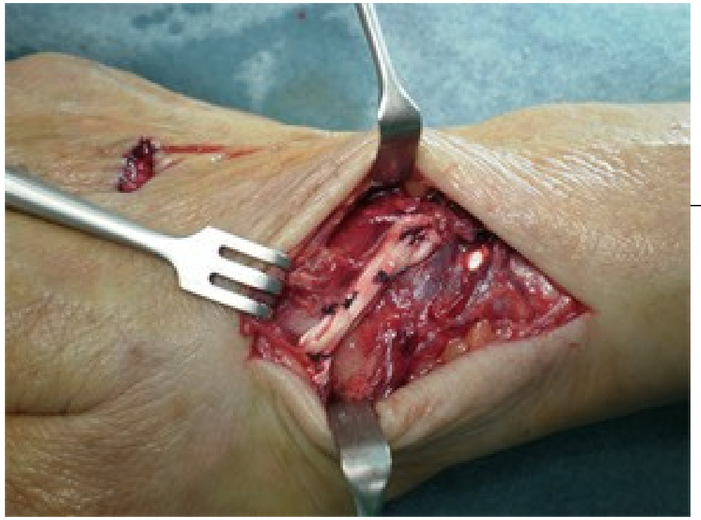
- Volarly 6-8 cm incision taken and modified Henry's approach was followed and the plate was exposed. Proximal and Distal screws removed using appropriate size screw drivers and the plate was removed.

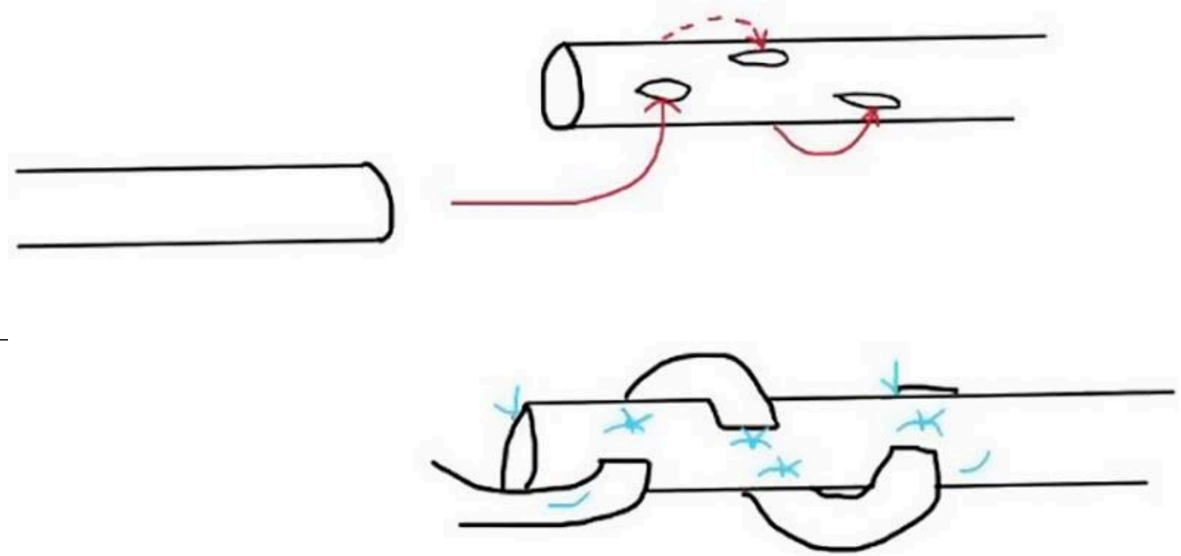
- To address the functional loss of thumb extension, the proximal EIP tendon was transferred to EPL using Pulvertaft Technique and graft harvested.

- The remaining distal segment of EIP was attached to Extensor Digitorum (ED) using a side to end repair preserving the extension function of the index finger. Extensor Retinaculum was sutured.

Measurement of graft size

Pulvertaft Weave Technique



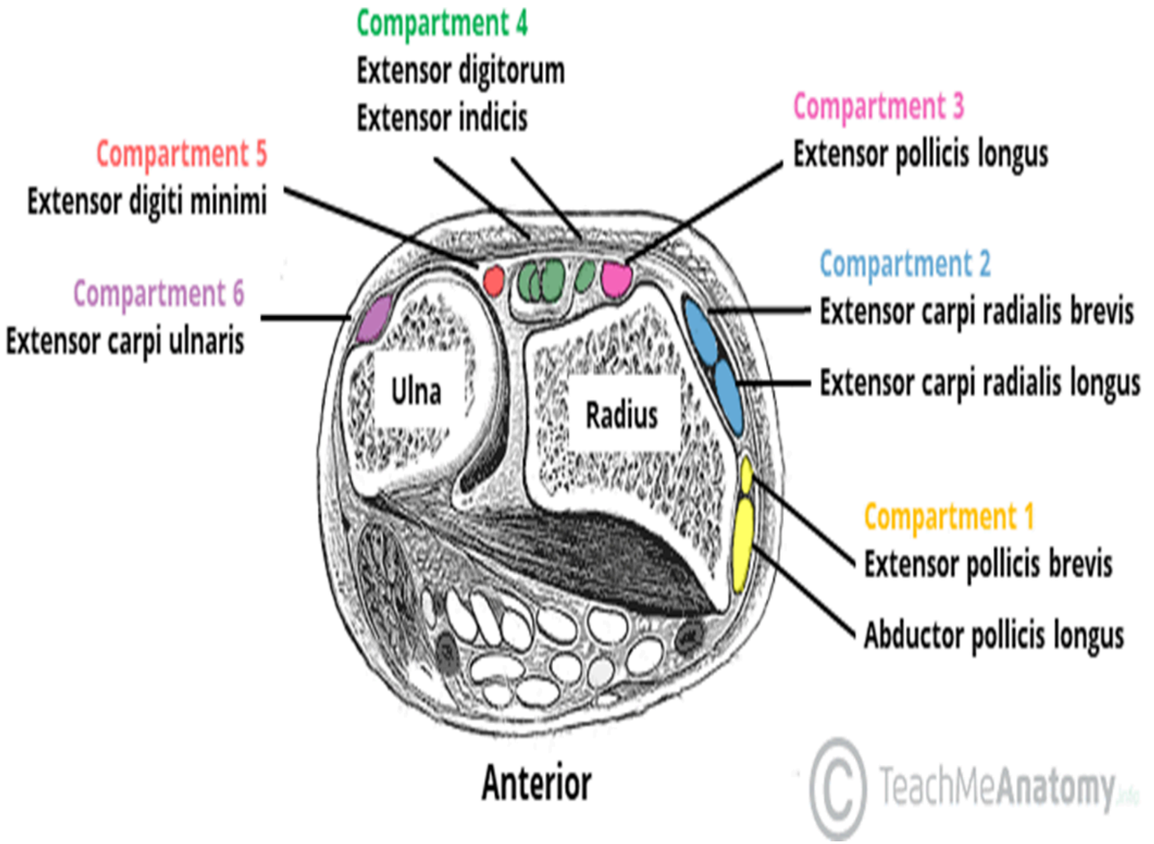


- Donor tendon approaching the recipient tendon
- Recipient tendon has multiple horizontal slits or incisions
- Entry and exit points made using needle with suture for weaving
- Donor tendon is passed through the slits in recipient tendon in a woven or interlaced fashion.
  - Sutures placed to secure tendon in place

Post op 4weeks

EXTENSOR COMPARTMENTS OF WRIST

1st: APL, EPB - 'Abductor Pollicis Longus & Extensor Pollicis Brevis’
2nd: ECRL, ECRB - 'Ext Carpi Radialis Longus & Brevis'
3rd: EPL - 'Ext Pollicis Longus'
4th: ED, EI - 'Ext Digitorum & Indicis'
5th: EDM - 'Ext Digiti Minimi'
6th: ECU - 'Ext Carpi Ulnaris'

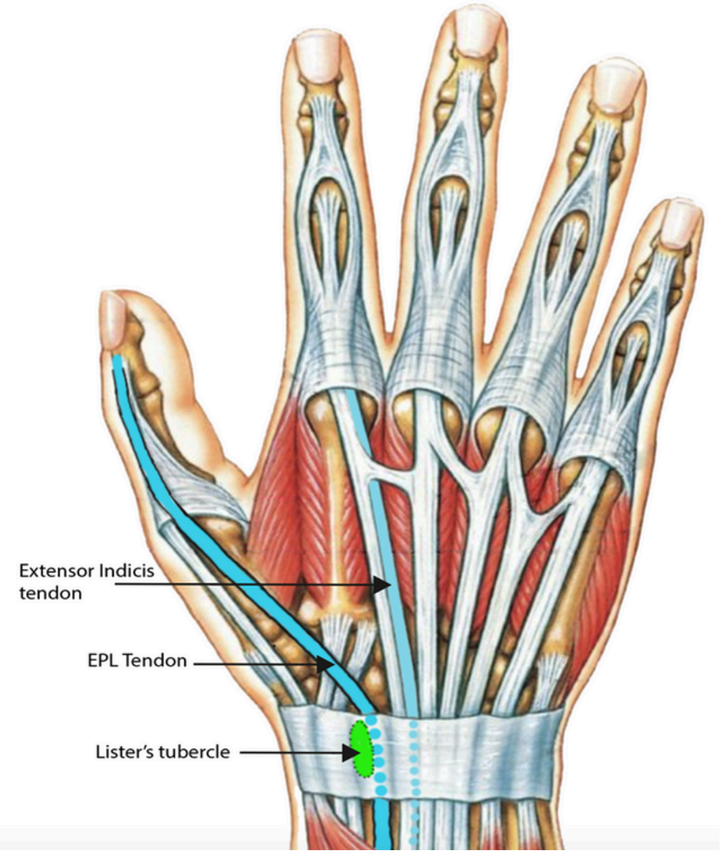


ANATOMY OF EPL

- Origin: Middle third of posterior ulna and interosseous membrane
- Course: Passes through 3rd extensor compartment
- Insertion: Base of distal phalanx of thumb

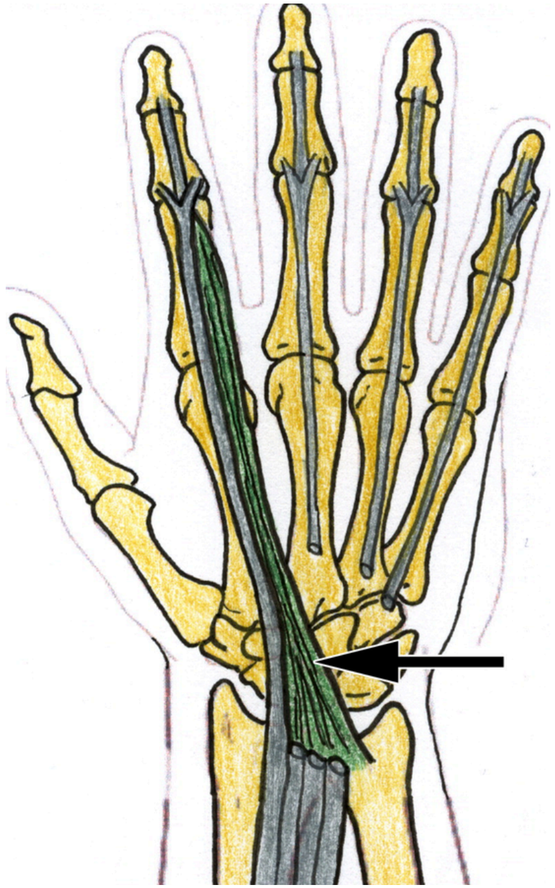
Functions of EPL :

• Extension of:
  - Interphalangeal (IP) joint of thumb
  - Metacarpophalangeal (MCP) joint of thumb
  - Carpometacarpal (CMC) joint of thumb
• Assists in radial deviation of the wrist



ANATOMY OF EIP

- 1. Origin: Posterior surface of the distal ulna and the interosseous membrane, which connects the ulna and radius.
- 2. Insertion: Extensor expansion of the index finger, specifically on the ulnar side of the tendon of the extensor digitorum.
- 3. Innervation: This muscle is innervated by the posterior interosseous nerve, a branch of the radial nerve
- 4. Function : Extend the index finger at the metacarpophalangeal and interphalangeal joints. This allows for precise movements of the index finger, which is crucial for tasks requiring fine motor skill



DISCUSSION

- 1.Delayed EPL rupture after volar plate fixation is rare but recognized, even when dorsal cortex is not violated
- The hypovascular zone of the EPL over Lister's tubercle predisposes it to attrition, particularly in the presence of dorsal callus, increased pressure or screw-tip irritation not visible on radiographs.
- 2. The EPL Tendon, which traverses the third dorsal compartment, is particularly susceptible to injury due to its close proximity to the dorsal cortex
- Even minimal screw penetration beyond the dorsal cortex can lead to chronic irritation and eventually tendon rupture
- Surgeons must be cautious of:
- • Screw length (use multiple fluoroscopic views)
- • Prominent dorsal callus formation
- • Early signs of extensor weakness
- .

3. EPL ruptures typically occur within 6 to 12 months after fixation, with reported rates ranging from 0.2% to 5%.

4. The involvement of the EIP tendon in this case adds another layer of complexity.
While the EIP is routinely used for tendon transfers to reconstruct the EPL, its simultaneous attrition made traditional transfer infeasible. It is likely that shared anatomical pathways within the fourth extensor compartment subjected both tendons to the same repetitive trauma caused by the prominent dorsal screws.

5. In this context, a modified approach was warranted. The proximal EIP was used to restore thumb extension by attaching it to the EPL.

6. To maintain index finger function, the remaining distal EIP was connected to the ED using side to end repair,
This dual-tendon strategy provided a stable, functional reconstruction despite the
rare complication.

EIP involvement, though rare, may occur:
- As a result of anatomical proximity
- From overuse due to compensating for a dysfunctional EPL
- Or shared exposure to local mechanical stress

Tendon transfer remains the mainstay of treatment for EPL rupture, with excellent outcomes when performed early.

Original Research

AAHS
AMERICAN ASSOCIATION FOR HAND SURGERY

HAND
2025, Vol. 20(5) 770–777

DOI: 10.1177/15589447241233763
journals.sagepub.com/home/HAN

Cause of Extensor Pollicis Longus Ruptures After Distal Radius Fracture Fixation Using a Volar Plate

Charlotte L. E. Laane[1,2], Anjuli L. Dijkmans[1], Chelsea J. Messinger[1,3,4], Mathieu M. E. Wijffels[2], Abhiram R. Bhashyam[1,3], and Neal C. Chen[1,3]

Conclusion : The incidence of EPL rupture after volar plating of DRF is between 0% and 1% and
usually occurs about 3 months after fixation. Approximately 50% of EPL ruptures are attributable to prominent dorsal screws. Although screw prominence is an important cause of EPL rupture, it is not the sole cause of rupture.

International Journal of Surgery Case Reports 122 (2024) 110105

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.elsevier.com/locate/ijscr

Case report

Extensor pollicis longus tendon penetration by a screw post-distal radius fracture plating in a young woman: A case report

Jaber AlKhyeli [1], Ahmed Mohamed Yousif Mohamed [1,*], Mohanad Abdulgadir [1]

Conclusion :

1. To ensure precise screw placement and avoid tendon damage, intraoperative imaging techniques such as lateral view, oblique views (45-degree supination, 45-degree pronation). It is essential to monitor patients following surgery for signs such as decreased thumb extension in order to quickly detect and treat any tendon-related complications.
2. Tendon function can be protected by
   prompt intervention in cases of suspected screw penetration, empha sizing the significance of careful postoperative care in maximizing patient outcome after this routine surgical procedure.

CONCLUSION

- 1. This case underscores the possibility of delayed combined EPL and EIP tendon attrition following volar plating of DER fractures even in anatomically placed implants. A high index of suspicion, prompt imaging, and timely surgical intervention are key to restoring function and avoiding permanent disability.
  2. This case uniquely illustrates the simultaneous compromise of both the EPL and EIP tendons, requiring an innovative approach to reconstructive surgery.
  3. The combined use of EIP-to- EPL transfer using Pulvertaft weave repair and side to end repair of EIP to the ED tendon preserved thumb and index finger function, respectively, highlighting the importance of surgical adaptability and careful postoperative monitoring.

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THANK YOU