

Clinical case

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## Spontaneous rupture of the extensor pollicis longus tendon after conservative treatment of a non-displaced distal radius fracture in an adolescent

*Rotura espontánea del tendón del extensor largo del pulgar tras el tratamiento conservador de una fractura no desplazada del radio distal en un adolescente*

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**ABSTRACT.** A spontaneous rupture of the extensor pollicis longus (EPL) tendon after a fracture of the distal radius is a known complication in adults. In contrast, there are a paucity of reports concerning EPL tendon ruptures in children and adolescents. The authors present a case of a spontaneous rupture of the EPL tendon in a 15-year-old girl after a non-displaced distal radius fracture. The patient had no predisposing factors including rheumatoid arthritis or steroid injection. During surgery, the EPL tendon was found to be ruptured at the extensor retinaculum (third compartment). Extensor indicis proprius (EIP) to EPL transfer was performed. At the 18-month follow-up, the patient was asymptomatic and showed satisfactory thumb function, with normal active extension.

**Keywords:** extensor pollicis longus, extensor indicis proprius, bone spur, child, wrist injuries, tendon transfer.

**RESUMEN.** La rotura espontánea del tendón del extensor largo del pulgar (EPL) tras una fractura distal del radio es una complicación conocida en adultos. En cambio, son escasos los informes sobre roturas del tendón del EPL en niños y adolescentes. Los autores presentan un caso de rotura espontánea del tendón del EPL en una niña de 15 años tras una fractura distal del radio no desplazada. La paciente no presentaba factores predisponentes como artritis reumatoide o inyección de esteroides. Durante la intervención quirúrgica, se descubrió que el tendón del EPL estaba roto a la altura del retináculo extensor (tercer compartimento). Se realizó una transferencia del extensor indicis proprius (EIP) al EPL. A los 18 meses de seguimiento, el paciente estaba asintomático y mostraba una función satisfactoria del pulgar, con una extensión activa normal.

**Palabras clave:** extensor largo del pulgar, extensor indicis proprius, espolón óseo, niño, lesiones de muñeca, transferencia tendinosa.

### Introduction

The extensor pollicis longus (EPL) is a muscle located in the forearm that extends the thumb. It is one of the six extrinsic tendons that passes through the wrist joint and is essential for thumb extension and abduction.

Wrist fractures are common injuries that can damage the tendons and ligaments around the wrist joint, including the EPL. Spontaneous rupture of the EPL can occur after a wrist fracture due to a combination of initial injury and subsequent stress or strain. EPL rupture after wrist fracture is a relatively rare complication, but can have a significant

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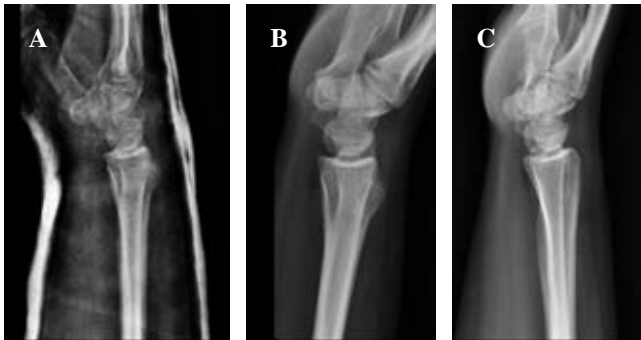


impact on hand function.<sup>1</sup> In adult retrospective studies, the incidence of EPL rupture ranges from 0.3 to 5%.<sup>2,3,4</sup> However, spontaneous ruptures in children and adolescents have rarely been reported.<sup>5,6</sup>

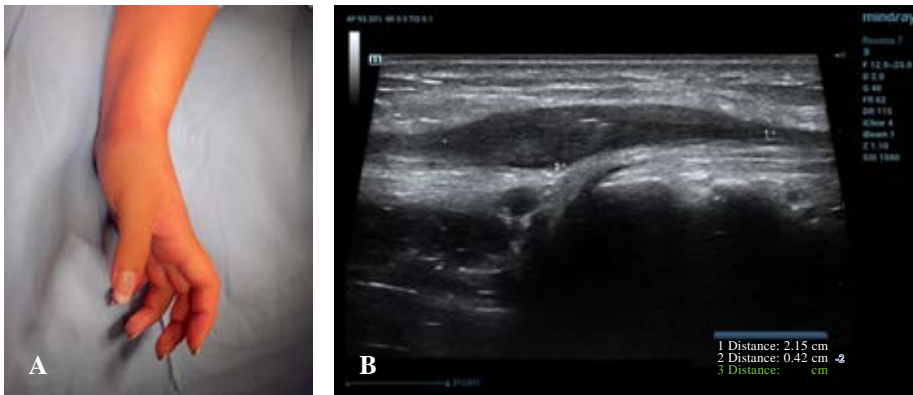
We report the case of a 15-year-old girl who had extensor pollicis longus tendon rupture after a non-displaced extra-articular distal radius fracture. Extensor indicis proprius tendon (EIP) transfer was performed, with excellent functional results.

### Case report

A 15-year-old female patient with no known medical history or rheumatological disease and who had not used systemic or local steroids was brought to the hospital after falling onto an outstretched hand. The patient presented with a minimally displaced extra-articular fracture of the left radius, which was managed conservatively with cast immobilization for four weeks (*Figure 1*). One month after the cast was removed, the patient visited our clinic complaining of a sudden inability to extend the left thumb. Examination revealed an inability to extend the left thumb at the interphalangeal joint, while the sensory nerve examination was intact (*Figure 2*). Plain radiographs showed a healed distal radius fracture and a prominent Lister tubercle. Ultrasound and MRI confirmed rupture of the extensor pollicis longus (EPL) tendon.



**Figure 1:** Lateral radiograph at initial conservative treatment (A), preoperative lateral radiograph showing a prominent dorsal bump of the radius (B), Postoperative lateral radiograph after bump resection (C).



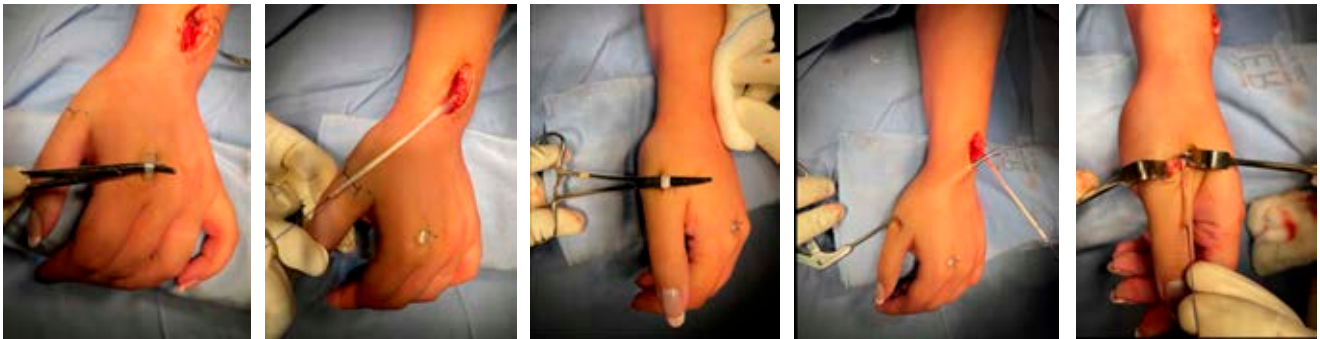
**Figure 2:**

A) Preoperative clinical images showing inability to actively extend the thumb.  
B) Ultrasound imaging confirming the injury.

As the injured tendon could not be repaired end-to-end, we performed extensor indicis proprius (EIP) for EPL transfer using the Pulvertaft weave technique (*Figure 3*) to restore thumb function. The EPL tendon was first approached through a dorsal incision and the distal stump of the EPL was divided at the level of the dorsal tubercle of the radius. A prominent Lister's tubercle was observed at the time of tendon transfer, which was resected using an osteotome. One centimeter distal to the Lister tubercle, after dissecting the soft tissue, the EIP was located (tendon with more distal muscle belly), a second 2 cm incision next to the metacarpophalangeal joint of the index finger to expose the extensor indicis proprius (EIP) located on the ulnar side of the extensor digitorum. The EIP tendon was cut into the proximal extensor hood. The EIP was then transferred to the wrist joint and then to the site of the first skin incision. The EIP then passed through a hole created in the EPL. With neutral wrist positioning, the EPL and EIP were pulled using two different mosquito clamps to maintain the thumb in full extension and transferred to the distal end of the EPL tendon. The suture of the transfer was termino-terminal, according to the Pulvertaft technique. During the procedure, the transfer tension is adjusted through the tenodesis effect, which involves verifying that when the wrist is flexed, the thumb extends to the interphalangeal joint of the index finger. When the wrist is maximally extended, the fingertips of the thumb should be able to touch the lateral edge of the second phalanx of the index finger. Postoperatively, a thumb spica cast was applied for six weeks. Rehabilitation was prescribed for six weeks after the cast was removed. At the 18-month follow-up, the patient was asymptomatic and showed satisfactory thumb function with normal active extension (*Figure 4*).

### Discussion

Spontaneous rupture of the EPL is rare in young patients. This injury has been described after elastic nailing using dorsal entry,<sup>7,8</sup> but very few cases have been described after non-displaced fractures.<sup>9</sup> The mechanism of EPL rupture after wrist fracture is not fully understood;



**Figure 3:** Intraoperative images showing extensor indicis proprius transfer technique.

however, it is believed to be related to the location of the EPL tendon in the wrist joint. The EPL tendon is vulnerable to injury because it passes through a narrow tunnel formed by the dorsal aspect of the radius and the extensor retinaculum. Fractures of the distal radius can damage the extensor retinaculum and surrounding soft tissues, resulting in a weakened EPL tendon. This can lead to EPL rupture when the tendon is subjected to further stress or strain during activities, such as gripping or lifting objects or performing repetitive thumb and wrist motions. Other authors<sup>2,3,10</sup> proposed that this condition occurs in fractures in which the extensor retinaculum is uninjured (most commonly in non-displaced distal radius fractures). An intact extensor retinaculum creates a rigid space in which the EPL tendon becomes compressed by hematoma and eventually by the fracture callus that forms beneath it. Symptoms of EPL rupture after wrist fracture include pain, weakness, and inability to extend the thumb fully. There may also be a visible gap or deformity in the wrist area where the tendon is located. Diagnosis can be made through physical examination and imaging studies such as X-rays, ultrasound, or MRI.

We recognized rupture of the EPL in our patient eight weeks after the fracture. This is consistent with other reports in the literature showing that EPL rupture occurs most commonly between 3 and 12 weeks after distal radius fracture.<sup>11,12</sup> The treatment options for EPL rupture after wrist fracture depend on the severity of the injury and the patient's individual needs. Conservative management, such as immobilization and physical therapy, may be sufficient in mild cases in which the tendon is not completely ruptured. In more severe cases, surgical intervention is necessary to restore the hand function. There are various surgical techniques for EPL rupture, including direct tendon repair, tendon transfer, and reconstruction using tendon grafts. Intercalated tendon grafting has been successfully used,<sup>13</sup> but this procedure requires two tendon repair sites and has difficulty overcoming myostatic contracture for appropriate tensioning. EIP transfer is the most popular and predictable treatment, with results equivalent to grafting, less technical complexity, and shorter operative time.<sup>14</sup> In our case EIP tendon transfer was selected because of the difficulty



**Figure 4:** Postoperative extension at one month (left image) and 18 months follow-up (right image).

repairing the tendon at the level of the musculotendinous junction which has been associated with extensor lag or index weakness.<sup>15</sup>

In conclusion, although distal radius fractures are common in pediatric adolescent patients, late EPL tendon ruptures are rare. As these ruptures can occur even after conservative treatment of non-displaced extra-articular radius fractures, early suspicion of tendon disruption is required to allow for prompt treatment. EIP to EPL transfer can predictably restore the thumb function.

#### References

1. Kunes JA, Hong DY, Hellwinkel JE, Tedesco LJ, Strauch RJ. Extensor tendon injury after volar locking plating for distal radius fractures: a systematic review. *Hand (N Y)*. 2022; 17(1\_suppl): 87S-94S. doi: 10.1177/15589447211068186.
2. Skoff HD. Postfracture extensor pollicis longus tenosynovitis and tendon rupture: a scientific study and personal series. *Am J Orthop (Belle Mead NJ)*. 2003; 32(5): 245-7.
3. McKay SD, MacDermid JC, Roth JH, Richards RS. Assessment of complications of distal radius fractures and development of a complication checklist. *J Hand Surg Am*. 2001; 26(5): 916-22. doi: 10.1053/jhsu.2001.26662.
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): 942-7. doi: 10.1016/j.jhsa.2012.02.006.
5. Patel HA, Lee MC, Chaudhry S. Extensor pollicis longus tendon rupture after a pediatric distal radius fracture: a case report and literature review. *JBJS Case Connect*. 2020; 10(3): e2000022. doi: 10.2106/JBJS.CC.20.00022.
6. AlSamhan AA, AL-Khayat AN, Jarragh AA. Extensor pollicis longus tendon delayed rupture following a minimally displaced distal radius

- fracture in adolescence. *Ortho Res Online J.* 2022; 9(4): OPROJ. doi: 10.31031/OPROJ.2022.09.000719.
7. Murphy HA, Jain VV, Parikh SN, Wall EJ, Cornwall R, Mehlman CT. Extensor tendon injury associated with dorsal entry flexible nailing of radial shaft fractures in children: a report of 5 new cases and review of the literature. *J Pediatr Orthop.* 2019; 39(4): 163-8. doi: 10.1097/BPO.0000000000000897.
  8. Stahl S, Calif E, Eidelman M. Delayed rupture of the extensor pollicis longus tendon following intramedullary nailing of a radial fracture in a child. *J Hand Surg Eur Vol.* 2007; 32(1): 67-8. doi: 10.1016/j.jhsb.2006.08.017.
  9. Song D, Evans R, Arneja JS. Delayed extensor pollicis longus tendon rupture following nondisplaced distal radius fracture in a child. *Hand (N Y).* 2013; 8(2): 242-4. doi: 10.1007/s11552-013-9494-9.
  10. Hirasawa Y, Katsumi Y, Akiyoshi T, Tamai K, Tokioka T. Clinical and microangiographic studies on rupture of the E.P.L. tendon after distal radial fractures. *J Hand Surg Br.* 1990; 15(1): 51-7. doi: 10.1016/0266-7681\_90\_90048-9.
  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. Bonatz E, Kramer TD, Masear VR. Rupture of the extensor pollicis longus tendon. *Am J Orthop (Belle Mead NJ).* 1996; 25(2): 118-22.
  13. Hamlin C, Littler JW. Restoration of the extensor pollicis longus tendon by an intercalated graft. *J Bone Joint Surg Am.* 1977; 59(3): 412-4.
  14. Mensche A. Spatruptur der sehne des extensor pollicis longus. *Munch Med Wochenschr.* 1925; 72: 836.
  15. Nigst H, Linder P. Spontaneous rupture of extensor pollicis longus. Report of 25 cases. *Reconstr Surg Traumatol.* 1971; 12: 242-9.

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**Authors' contribution:** AF conceived and designed the study, conducted research, provided research materials, and collected and organized data. JGT conceived and designed the study, analyzed and interpreted data. JM wrote the initial and final draft of the article. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.