

Accessory Extensor Pollicis Longus Spanning the Fourth Dorsal Compartment of the Wrist: A Case Report

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Learning Point of the Article:

Accessory EPL tendon can be initially missed on imaging. Knowledge of this anatomic variation allows the surgeon to anticipate this finding and plan accordingly to mitigate an iatrogenic injury.

Abstract

Introduction: Variations of the extensor pollicis longus (EPL) tendon of the hand are not uncommon. Yet, this anatomic structure exhibits the least variations among the extensors of the upper extremity.

Case Report: This article highlights the presence of an accessory EPL tendon in the fourth dorsal compartment, which was presented as an incidental finding during an elective wrist arthrodesis in a woman in her 40s.

Conclusion: Knowledge of this anatomic variation can guide surgical planning and mitigate iatrogenic injury by anticipating potential challenges.

Keywords: Extensor pollicis longus, anatomic variation, wrist arthrodesis.

Introduction

Anatomic variations in the extensor compartments of the hand are not uncommon, including an accessory extensor pollicis longus (EPL) tendon with an anomalous course. According to the literature, the course of the EPL tendon passes through the third dorsal compartment and inserts dorsally at the base of the distal phalanx of the thumb¹. There have been several reports describing different anatomic variations of the EPL tendon. However, this case describes a unique incidental finding of an accessory EPL tendon in the fourth dorsal compartment that became an obstacle during an elective wrist arthrodesis. Highlighting this anatomic variation and the surgical steps adopted in this report could help in future surgical planning and avoid iatrogenic damage to the tendon.

Case Report

A right-handed female in her 40s with a history of intravenous (IV) drug use, Type 1 diabetes, and chronic kidney disease presented to the clinics with complaints of chronic right wrist pain and stiffness that started 6 months before presentation. Initially, the patient presented with a right distal forearm abscess, for which she received IV antibiotics followed by irrigation and debridement. On physical exam, the sensation of the hand and wrist was intact. The patient had localized tenderness over the carpal region and decreased range of motion on flexion, extension, radial, and ulnar deviation of the right wrist. The passive and active range of motion of the thumb did not elicit any pain. Radiographs of the right wrist revealed osteolysis and destructive erosive changes suggestive of osteomyelitis at the radiocarpal, intercarpal, and carpometacarpal regions. Pre-

Author's Photo Gallery



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Figure 1: Intraoperative picture revealing the dorsal compartment of the right wrist.



Figure 2: Extensor pollicis longus tendon in the 3rd dorsal compartment of the right wrist-retracted with thumb extension.

operative magnetic resonance imaging (MRI) of the wrist revealed extensive synovitis in similar anatomic regions. After failed conservative management, the patient was scheduled for radio carpometa carpal arthrodesis due to persistent pain and degenerative arthritis.

Operative technique

A dorsal longitudinal incision was performed along the third metacarpal axis and between the third and fourth dorsal extensor compartments. Starting from the Lister's tubercle, the main EPL tendon was identified, released from the third dorsal compartment, and retracted radially (Fig. 1 and 2). Subsequently, a subperiosteal elevation of the fourth dorsal compartment was performed and reflected ulnarly to expose the radiocarpal joint. During this dissection, an accessory EPL tendon that extended the thumb at the interphalangeal (IP) joint, though not as strong as the main EPL, was incidentally

identified (Fig. 3). The supernumerary EPL tendon was approximately half the size of the main EPL tendon. The remaining neighboring tendons did not lead to a similar action of the EPL when tested, and traction of the accessory EPL tendon did not cause a simultaneous extension of the index finger. Because the accessory EPL tendon crossed the surgical field from the fourth dorsal compartment radially to the thumb's distal phalanx, careful ulnar retraction was required to avoid tendon injury (Fig. 4). Furthermore, an additional extension of the incision proximally and distally was required to allow for adequate retraction of the accessory EPL tendon and proper fusion plate placement. Once the bony surfaces of the radius, carpus, and third metacarpal bones were prepared, a prevent short wrist fusion plate from the Integra (Smith and Nephew) Wrist Fusion system was installed. The plate was fixed distally to the third metacarpal and proximally to the distal dorsal radius. During this step, Ragnell retractors were used to prevent injury to the accessory EPL. Before the incision closure,



Figure 3: Accessory extensor pollicis longus tendon in the 4th dorsal compartment of the right wrist-retracted with thumb extension.

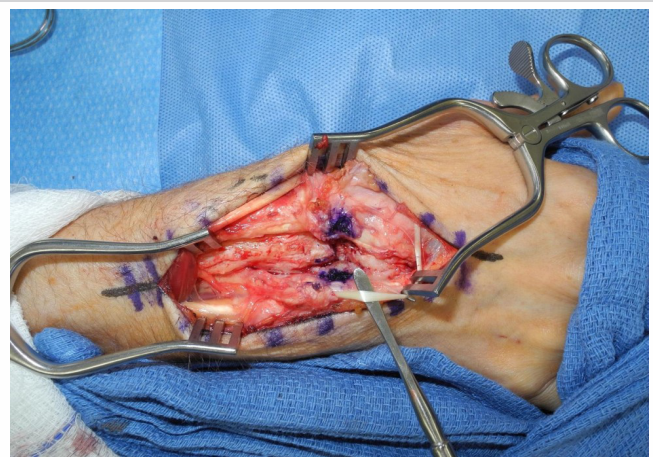


Figure 4: Accessory extensor pollicis longus tendon retracted away to perform wrist arthrodesis.

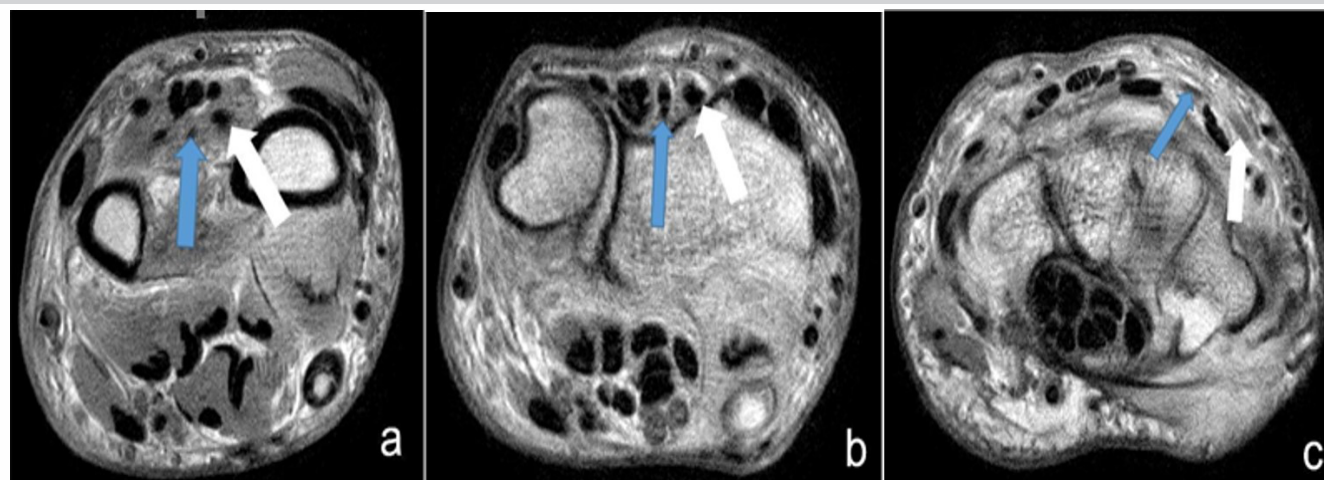


Figure 5: (a) Axial proton density MRI. The proximal section of the right wrist-blue arrow: Accessory extensor pollicis longus (EPL) tendon; white arrow: EPL tendon. (b) Axial proton density MRI. Midsection of the right wrist-blue arrow: Accessory EPL tendon; white arrow: EPL tendon. (c) Axial proton density MRI. The distal section of the right wrist-blue arrow: Accessory EPL tendon; white arrow: EPL tendon.

the accessory EPL tendon was left superimposed over the fusion plate with an intervening soft-tissue layer in between. Because of time and exposure limitations during surgery, a separate muscle belly for the accessory EPL was visualized yet the muscle origin could not be identified. On the other hand, the insertion was inferred to be on the thumb distal phalanx

based on intraoperative mechanical testing. The pre-operative MRI was reviewed again in light of this intraoperative finding to locate the accessory EPL (Fig. 5). Postoperatively, the wrist was placed in a short arm fiberglass cast for 4 weeks. It was transitioned to a custom occupational therapy splint for another 4 weeks while increasing the range of motion and daily activities. At her final follow-up (6 months), the patient recovered uneventfully with a healed incision, resolution of pain, and satisfying range of motion at the MCP, PIP, and DIP finger joints (Fig. 6).

Discussion

Usually, the EPL tendon runs its ordinary course in the third dorsal extensor compartment as the only tendon and allows for thumb extension. The posterior interosseous branch of the radial nerve innervates the EPL. It originates from the interosseous membrane and inserts on the distal phalanx of the thumb [1]. A supernumerary EPL



Figure 6: (a) Pre-operative Anteroposterior (AP) X-ray of the right wrist. (b) Immediate post-operative AP X-ray of the right fused wrist. (c) 4 weeks post-operative AP X-rays of the right fused wrist. (d) Pre-operative Lateral (Lat) X-ray of the right wrist. (e) Immediate post-operative Lat X-ray of the right fused wrist. (f) 4 weeks post-operative Lat X-rays of the right fused wrist.

Table 1: Studies reporting anomalies in EPL tendon

Author	Type of paper	Type of variation	Turker classification of supernumerary EPL tendons
Wood (1867) [8]	Cadaveric case series	Supernumerary	Type 1e (most common anomaly described)
Kaplan and Nathan (1969) [9]	Cadaveric case series	Supernumerary (4 th compartment)	Type 1c
Chiu (1981) [10]	Cadaveric case report	Supernumerary (4 th compartment)	Type 1a
Culver (1980) [11]	Case report of an elective surgery	Supernumerary (4 th dorsal compartment)	Type 1e
Cohen and Haber (1996) [3]	Case report of an elective surgery	Supernumerary (4 th compartment)	Type 1a*
Abu-Hijleh (1993) [12]	Cadaveric case report	Supernumerary (4 th compartment)	Type 1d
Papaloizos (2004) [13]	Cadaveric case report	Supernumerary (4 th compartment)	Type 1a
Yoshida (1990) [1]	Cadaveric case series	Supernumerary	Type 1e (most common anomaly described)
Beatty <i>et al.</i> (2000) [14]	Case report of an elective surgery	Supernumerary (3 ^d compartment)	Type 1b
Sawaizumi <i>et al.</i> (2003) [15]	Case report of an elective surgery	Supernumerary (between 1 st and 2 nd compartment)	Type 1f
De Greef and De Smet (2006) [4]	Case report of an elective surgery	Supernumerary (4 th compartment)	Type 1a*
Türker <i>et al.</i> (2010) [2]	Case series of elective surgeries	Supernumerary	Type 1a (×1)*, Type 1e (×2)
Jiang <i>et al.</i> (2020) [16]	Case report of emergency surgery	Supernumerary (between 1 st and 2 nd compartment)	Type 1f
Tordjman <i>et al.</i> (2017) [5]	Case report of an elective surgery	Supernumerary (4 th compartment)	Type 1a*
Bluth <i>et al.</i> (2011) [17]	Cadaveric case report	Supernumerary (4 th compartment)	Type 1c
Nishijo <i>et al.</i> (2000) [18]	Case report of an elective surgery	Supernumerary (3 ^d compartment)	Type 1b
Sevivas <i>et al.</i> (2009) [19]	Case report of an elective surgery	Supernumerary (3R/3U compartments)	Type 1a
Masada <i>et al.</i> (2003) [20]	Case report of an elective surgery	Supernumerary (3 ^d compartment)	Type 1b** (arising from the same muscle belly)
Talbot <i>et al.</i> (2013) [6]	Cadaveric case report	Supernumerary (4 th compartment)	Type 1a and Type 1e
Wiekrykas <i>et al.</i> (2021) [7]	Case report of an elective surgery	Supernumerary (4 th compartment)	Type 1e
Current study: Saade <i>et al.</i> (2023)	Case report of an elective surgery	Supernumerary (4 th compartment)	Type 1a*

*: These studies were classified as Type 1a based on the extension of the thumb IP joint upon traction of the accessory EPL tendon. Insertions in these cases could not be identified due to surgery. **: Type 1b classification described by Türker *et al.* includes accessory tendon with an independent muscle belly

tendon is an accessory or duplicated tendon. Yoshida reported that the EPL tendon is the most stable extensor tendon of the

upper limb, with 3.6% of the cadaveric subjects having duplicated EPL tendons. The most common variation of the

EPL tendon cited in the literature is based on the duplication of the tendon from the same or different muscle bellies of the EPL. Türker et al. described a classification system based on accessory tendons: Type 1 describes distinct tendons, while Type 2 describes tendon interconnections [2]. Previous case reports based on elective surgeries could not carry out extensive dissections to identify the EPL origin and insertion. Nevertheless, they classified their case as Type 1a according to the extension of the IP joint of the thumb following intraoperative traction of the accessory EPL tendon [2-5]. Based on this classification, our case can be described as Type 1a.

In this case, the patient was unaware of this variation as they did not experience any symptoms or functional differences related to the accessory EPL tendon. Talbot mentioned that most anomalies related to muscle or tendon insertions duplicated or enhanced their function instead of altering it by presenting a new geometry of muscular function. He went on to describe that these individuals have no reference to comparing this functional enhancement to others [6]. As a result, these anatomic variations are mostly discovered incidentally. This report summarizes the types of accessory EPL tendons found incidentally during surgical cases or cadaveric dissections (Table 1).

The incidental finding in our case became an obstacle when the accessory EPL tendon obstructed the plate's insertion site. This is not the first case of a supernumerary EPL tendon running in the fourth dorsal compartment. De Greef reported a case with a similar incidental finding requiring a wrist arthrodesis [4]. However, it did not include a description of the intraoperative steps. This case report provides surgical steps required to

handle an accessory EPL tendon following an intraoperative incidental finding.

Knowledge of anatomy and its variation is crucial to allow preservation of the accessory tendon instead of being removed/cut to minimize any chance of adhesion or discomfort that may arise over the plate. Furthermore, the accessory tendon was left intact to preserve its function.

For instance, in a report describing a full EPL tendon rupture following a distal radius fracture, the patient could extend their distal thumb phalanx, albeit to a lesser extent, due to the accessory EPL tendon [7]. Another advantage would be to use this accessory tendon as a graft in light of a tendon rupture repair.

Conclusion

The majority of the EPL tendon variants are due to the presence of an accessory tendon. Although these variations are asymptomatic and found incidentally, knowledge of their occurrence will guide surgical planning and help overcome intraoperative challenges.

Clinical Message

The primary aim in documenting and sharing this case is to contribute to the ongoing scientific discourse about the human anatomical variations of the EPL and their impact on surgical practice. This anatomic variation can go unnoticed in imaging in the beginning. This report could be an important resource for surgeons who might encounter similar variations in the future, enabling them to plan their procedures better and anticipate potential challenges.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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