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Case Report

Accessory Extensor Pollicis Longus Tendon Classification Modification

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Supernumerary extensor pollicis longus (EPL) and extensor indicis proprius tendons are infrequently reported. There are few case reports on more than one accessory tendon in one individual. As a result, they are not represented in previously described classifications for variations in extensors to the thumb. Elective surgery was performed on a 57-year-old right-handed female. Within the fourth compartment, two anomalous accessory tendons were present. These tendons were identified as an accessory EPL tendon and an accessory extensor indicis proprius tendon. The normal EPL tendon occupied the third compartment ulnar to Lister's tubercle, as usual. The previous classification system for anomalous EPL tendons is useful in the organization and description of thumb extensor tendon variations. However, it is not a complete representation of the anomalies identified, including the one in this report. We have proposed an additional category for this classification system to better encompass the variation in anomalous tendon anatomy.

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Anomalous variations of the extensor tendons of the hand are common. These anomalies range from individualized muscle bellies and tendons to connections between tendons.¹ Accessory extensor tendons are more common on the ulnar side of the hand than the radial side. Thus, supernumerary extensor pollicis longus (EPL) and extensor indicis proprius (EIP) tendons are less frequently reported given their more radial placement.

There have been case reports of accessory tendons to the thumb and index finger identified during cadaveric dissection and during emergency and elective surgery.^{2–12} A cadaveric study of 95 dissections reported the observed incidence of duplicate EPL tendons to be 32.6% and the observed incidence of accessory tendons to the index finger to be much rarer at 3.2%.¹³ The deviation in tendon morphology of the thumb and index finger has been reported as either connections between the EIP and EPL tendons, doubling of the individual tendons, doubling of the muscle belly or abnormal origin or insertion. There have been only two other reports to our knowledge describing two anomalous accessory tendons in the same individual; one to the thumb and one to the index finger.^{14,15}

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A classification system has been previously reported to describe anomalous thumb extensor tendon morphologies by Türker et al.¹⁶ While useful, this system is limited due to the low case numbers used for its original description. Given this report, depicting the third case in which two radial-sided accessory extensor tendons have been identified in one individual, the classification system should be modified to include these findings.

Case Report

A 57-year-old right-handed female developed a grade 3 scapholunate advanced collapse (SLAC) wrist. Conservative management measures were unsuccessful in alleviating her symptoms; thus, she was consented for a four-corner fusion of the right wrist.

A standard dorsal wrist incision was used. The extensor retinaculum was incised to unroof the third extensor compartment, where the normal EPL tendon was identified. The fourth extensor compartment was then entered by releasing the septum between the third and fourth compartments, raising an ulnarly based retinacular flap. Within the fourth compartment, two accessory tendons were identified. The normal EIP and extensor digitorum communis (EDC) to the index to little finger was identified. The anomalous tendons were coursing together and smaller in nature. The anomalous EPL ran toward the thumb, ulnar to the normal EPL. The anomalous EIP ran toward the index finger, radial to EIP and



Figure 1. Identification of the anomalous EPL running toward the thumb and the anomalous EIP running toward the index finger inserting on the radial side of the extensor hood.



Figure 2. A static demonstration of traction through the two accessory tendons identified resulting in thumb IPJ extension and index metacarpophalangeal (MCP) joint extension.

EDC, inserting on the radial side of the extensor hood (Fig. 1). Neither tendon had a subcompartment within the fourth compartment.

Gentle traction of the two accessory tendons identified resulted in thumb interphalangeal joint (IPJ) extension and index metacarpophalangeal joint (MCPJ) extension (Fig. 2, Video 1). Traction of the normal EPL tendon also resulted in the extension of the thumb IPJ, as expected.

Informed consent was obtained from all individual participants included in the study.

Discussion

Anomalies in extensor tendons to the thumb and index finger are rare with only a few variations having been described. Supernumerary tendons to the index finger are rarer still. Anomalies in the tendon of the index have traditionally been described as a tendinous connection between the EPL tendon and the EIP tendon first named *extensor pollicis et indicis* by Wood¹⁷ in the 1860s. Since the original description, there have been several case reports of this tendinous connection, more recently referred to as *extensor pollicis et indicis accessories*.^{18,19} A single anomalous accessory tendon that splits to both the index finger and thumb has been deemed the *extensor pollicis et indicis comminus*.^{16,20}

There are only two other cases reporting on two radial-sided accessory tendons in the same individual. Most recently, a case report in 2021 by Qin et al¹⁵ demonstrated evidence of a

duplication of the EPL tendon in addition to a duplicated tendon of the EDC of the index finger found during an elective procedure. Both accessory tendons were found together passing through the fourth compartment. Al-Neklawy et al¹⁴ performed a cadaveric dissection in 2016 demonstrating an accessory EPL tendon passing through the third compartment and an accessory EIP tendon passing through the fourth compartment.¹⁴ This is different from our patient, where both anomalous tendons passed through the same compartment, like the report by Qin et al.¹⁵

Türker et al¹⁶ classified anomalous thumb extensor tendon anomalies based on separate tendons (type 1) or tendon interconnections (type 2). The types are then further subclassified based on variations in the supernumerary tendon locations, orientations, and interconnections. The classification system, while useful in organizing extensor tendon variations, is limited by the low numbers of reported cases of tendon anomalies. It therefore is lacking a category for two radial-sided anomalous accessory tendons.

Given this case and the two previous reports with similar findings, we propose an additional category for the classification by Türker.¹⁶ The configuration in the observed case has two accessory tendons that are separate from the normal tendons as opposed to tendon interconnections. In the current classification, categorization of multiple separate accessory tendons is not possible, as this situation is different from one tendon that splits into two, as noted in the *extensor pollicis et indicis comminus*.¹⁶ Thus, a type 3 category would encompass those situations where there is an anomalous

Table
Updated Classification of the Anomalous Accessory Tendon Configurations to the Thumb

Type 1. Separate tendon variations	1a	Double EPL tendons (different compartment)
	1b	Double EPL tendons (same compartment)
	1c	Double origin of the EPL tendon (different compartment)
	1d	Extensor pollicis tertius
	1e	Extensor pollicis et indicis communis
	1f	Extra compartmental two-slip extensor pollicis tendons
Type 2. Interconnections of the extensor tendons	2a	Interconnection between the EPL and the EIP (the extensor pollicis et indicis accessories)
	2b	Interconnection between the EPL and EDC2 (junctura tendinum)
	2c	Interconnection between the EPL and the extensor apparatus of the index finger (tendon slip from the third compartment)
	2d	Interconnection between the EPL and the extensor apparatus of the index finger (tendon slip extra compartmental)
Type 3. Multiple accessory tendons	3a	Double EPL tendons with accessory extensor tendons to index (anomalous tendons in same compartment)
	3b	Double EPL tendons and accessory extensor tendons to index (anomalous tendons in different compartment)

EPL in conjunction with an anomalous tendon to the index finger. Given our findings and those of Qin et al, when the two anomalous tendons are within the same compartment, this would be classified as a type 3a anomaly (Table). This would be the case whether it was an accessory EIP or an accessory EDC to the index, which to date have been seen coursing through the fourth compartment.¹⁵ Alternatively, a type 3b anomaly would be when the two anomalous tendons are in separate compartments. This was seen in the cadaveric study by Al-Neklawy et al,¹⁴ in which the EPL and an accessory EPL were in the third compartment while the EIP and accessory EIP were in the fourth compartment (Table). The anomalous configuration would be considered a type 3b anomaly whether it is an EIP or EDC.

Appreciation of tendon variations and duplication is pertinent when assessing and surgically managing the diseased hand. When variability is present within the tendon morphology, it is essential to further delineate the anatomical course intraoperatively and adapt the surgical strategy appropriately. This knowledge is helpful in trauma situations to understand alignment of tendon morphology and course. There is also potential application of these tendon duplications in tendon transfer surgery, as the additional tendons can be used as potential donor tendons.

In this study, we report on a rare finding in which two accessory tendons are found in the same upper extremity. We have proposed an alteration to a previously described classification system to include these findings. The classification system is useful in the organization and description of extensor tendon variations to the thumb. A large sampling of reported cases of tendon anomalies can increase the scope of the classification system to make it increasingly thorough and descriptive.

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