

Multi-Tendon Abductor Pollicis Longus Muscle and its Clinical Significance

Marc R. Schneider, Dimo Stoyanov, Meglena Angelova, Desislava Marinova, Veselina Mihaleva*

Department of Human Anatomy and Cell Biology, Faculty of Medicine, Medical University Varna, Bulgaria

*Corresponding author e-mail: marcronaldschneider@gmail.com

Accessory tendons of the abductor pollicis longus muscle with variable insertions are a recurrent variation. Anatomical variations in this muscle group have profound clinical importance due to their significance during surgical intervention and correlation with wrist pathology. We are highlighting the importance of anatomical anomalies for the clinical operative setting with a rare case of a multi-tendon abductor pollicis longus insertion.

Key words: abductor pollicis longus, variations, deQuervain Syndrome

Introduction

Abductor pollicis longus muscle (APL), extensor pollicis brevis and extensor pollicis longus comprise the posterior antebrachial muscle group of the thumb. The latter executes movements in the carpal and the trapeziometacarpal joints and promotes their stability [1, 5, 6,7].

An APL tendon duplicity has been widely documented appearing in 56% to 98.5% of hands.

Classically the tendon of the APL attaches to the base of the first metacarpal bone. A relatively common anatomical variation of the APL is the presence of accessory tendons that have several major insertion patterns: 1. Insertion into abductor pollicis brevis, fascia or opponens pollicis 2. Insertion into the styloid process, trapezium or scaphoideum bone, variable areas of the 1st metacarpal bone or 1st phalanx, capsule of 1st carpometacarpal joint 3. Fusion with tendons of other muscles [1, 2, 3, 10]. We report a case of a multi-accessory tendon abductor pollicis longus muscle found during routine dissection and discuss the clinical significance of this anatomical variation.

Materials and methods

During routine dissection of the right upper limb of a cadaver in the dissection facility of the Medical University – Varna, we observed an anomalous muscle in the extensor compartment of the forearm. After the removal of the skin and superficial fascia of the forearm, we dissected the osteofibrous channels of the extensor retinaculum and exposed the musculature making up the “anatomical snuffbox”. All the muscles and tendons were inspected and it was observed that the APL has additional tendon slips. Cadaver material was obtained according to Regulation No 2 from 18.05.2012 of the Bulgarian Ministry of Health.

Results

Our dissection revealed three tendons arising from the body of the APL. The abductor pollicis longus muscle generally originates from the lateral part of the posterior surface of the body of the ulna, the interosseous membrane, and the middle third of the posterior surface of the radius. The muscle usually inserts on to the radial side of the base of the first metacarpal bone. In our case APL has normal origin but presents with two well-defined tendons arising from separated parts of the muscle belly (**Fig. 1A, B**). Two of the three tendons arise from the muscle body. The first is the main tendon and attaches at its normal anatomical position on the first metacarpal bone. The second is an accessory tendon, lies deeper to the main one and fuses with the body of the abductor pollicis brevis. The third is fairly small, splits off from the main tendon and inserts on the joint’s capsule (**Fig. 1C**).

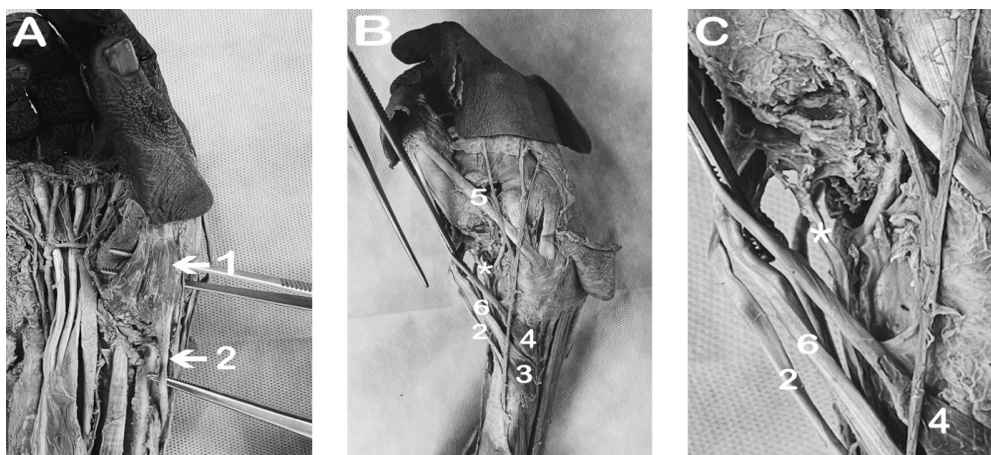


Fig. 1. A) The instruments display the accessory tendon of the APL with the insertion into abductor pollicis brevis muscle. B) Overview of the muscles around the joint and the multi-tendon APL. The instrument visualizes the relationship between the tendons. C) Insertion of the second accessory tendon in the the joint capsule. **Annotations:** 1. abductor pollicis brevis, 2. Accessory tendon, 3. abductor pollicis longus, 4. extensor pollicis brevis, 5. Tendon of extensor

pollicis longus, 6. Main tendon of APL, * Second accessory tendon, Arrow - the joint cavity of the 1st carpometacarpal joint.

Discussion

Posterior forearm muscle variations are common in routine dissections. A great variety of muscle bellies, tendons and insertion points have been described in the literature. In the case of thumb musculature, these variations may be explained by improvement of its movements. Some authors argue that the widespread area of attachments, ensured by the accessory tendons, could ensure better stability during movements of the 1st carpometacarpal joint or radial wrist deviation [9]. On the other hand, the distal third of the forearm and the posterior wrist area are places of closely related structures, covered by the extensor muscle retinaculum that forms narrow osteofibrous canals for the muscle's tendon. The presence of additional structures can lead to compression syndromes, tendovaginitis with limb overload, osteoarthritis and others. De Quervain syndrome, first carpometacarpal arthritis and trapeziometacarpal subluxation are examples of complications that may develop as a result of the described variations in the APL muscle [7, 10]. The knowledge of accessory muscle tendons can be used for the needs of plastic surgery. Accessory abductor pollicis longus (AAPL) tendon can be used as grafting material for reconstruction after chronic extensor pollicis longus ruptures, to treat osteoarthritis of the base of the thumb or other tendinous and ligamentous injuries of the hand [4].

Conclusion

Anatomical variations in this area and the APL respectively, are characteristic for a variety of pathology f.e De Quervain's Syndrome, first carpometacarpal arthritis, and trapeziometacarpal subluxation [7, 10]. They might influence joint functionality, which underlines the significance of upper limb anomalies in the operative clinical setting and eventually alter therapeutic outcomes [8].

Acknowledgements: We want to thank our dissection hall attendants for their general help in the dissection sector.

References

1. **Baba, M. A.** The accessory tendon of the abductor pollicis longus muscle. – *Anat. Rec.*, **119(4)**, 1954, 541-547.
2. **Bergman's Comprehensive Encyclopedia of Human Anatomic Variation.** 2016 John Wiley & Sons, Inc.
3. **Bharambe, V., D. Patel, P. R. Manvikar, S. Shevade, P. G. Bajpayee.** A study of extensor pollicis longus and brevis and abductor pollicis longus from the perspective of evolution. – *J. Med. Res.*, **3(3)**, 2017, 146-150.
4. **Bravo, E., R. B. Febopras, A. Febot.** Anatomic study of the abductor pollicis longus a source for grafting material of the hand. – *Clin. Orthop. Relat. Res.*, **468**, 2010, 1305-1309.

5. **El-Beshbishy, R. A., G. A. Abdel-Hamid.** Variations of the abductor pollicis longus tendon: an anatomic study. – *Folia Morphol.*, **72(2)**, 2013, 161-166.
6. **Imaeda, T., K. N. An, W. P. Cooney** 3rd. Functional anatomy and biomechanics of the thumb. – *Hand Clin.*, **8(1)**, 1992, 9-15.
7. **Karada, P., L. Olewnik, M. Podgórski, M. Polgaj, K. Ruzik, B. Szewczyk.** Anatomical variations of the abductor pollicis longus: a pilot study. – *Folia Morphol.*, **79(4)**, 2020, 817-822.
8. **Nam, Y. S., G. H. Doh, K. Hong, S. Lim, S. Eo.** Anatomical study of the first dorsal extensor compartment for the treatment of de Quervain's disease. – *Annals of Anatomy*, **218**, 2018, 250-255.
9. **Oudenaarde, E. V.** Structure and function of Abductor pollicis longus muscle. – *J. Anat.*, **174**, 1991, 221-227.
10. **Tewari, J., P. R. Mishra, S. K. Tripathy.** Anatomical variation of abductor pollicis longus in Indian population: A cadaveric study. – *Indian J. Orthop.*, **49(5)**, 2015, 549–553.