

Original Research Article

Variation of abductor pollicis longus tendons in cadavers

R. K. Jain, Nihit Mantri, P. Mandlecha*

Department of Orthopaedics, Sri Aurobindo Medical College and Post Graduate Institute, Indore, Madhya Pradesh, India

Received: 15 February 2018

Revised: 20 March 2018

Accepted: 21 March 2018

***Correspondence:**

Dr. P. Mandlecha,

E-mail: nihit800_mantri@yahoo.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: First extensor compartment of the wrist comprises of abductor pollicis longus and extensor pollicis brevis. It helps in movement and stabilization of thumb. Variations in the number of tendons of APL muscle may be asymptomatic and often incidental finding. Stenosing tenosynovitis of the first dorsal compartment of the wrist or de Quervains disease is a commonly encountered debilitating condition of the wrist.

Methods: This cadaveric study was done on 40 forearms in 20 cadavers available in Department of anatomy and forensic medicine at our institute. The muscles of extensor compartments were dissected, extensor retinaculum split over first extensor compartment, tendons of APL exposed. Study period from February-2017 to February-2018.

Results: There were 6 female and 14 male cadavers. The APL muscle was found with a single tendon in 2, double in 30, triple in 8. There were variations in the insertion of the APL tendon as well. In all hands, the APL tendon had insertion into the first metacarpal bone and in 20 hands (50%), it had second insertion into the trapezium.

Conclusions: Variation of APL muscle insertion in the Indian population and two or more tendinous slips attached commonly to the first metacarpal base and the trapezium may be the cause of treatment failure in DQT and cause of Trapeziometacarpal arthritis. Further studies needs to be done for further evaluation.

Keywords: Abductor pollicis longus tendon, Slips, Metacarpal, Trapezium

INTRODUCTION

First extensor compartment of the wrist comprises of abductor pollicis longus and extensor pollicis brevis. It helps in movement and stabilization of thumb. Variations in the number of tendons of APL muscle may be asymptomatic and often incidental finding. Stenosing tenosynovitis of the first dorsal compartment of the wrist or de Quervains disease is a commonly encountered debilitating condition of the wrist. The common mode of treatment is conservative, but recurrence is seen in 15–20% of cases in this management. Several factors are responsible for the recurrence. Literature suggests that the anatomical variations in the first dorsal compartment of the wrist like supernumerary tendon slips, aberrant

compartments or presence of septa, and variation of insertion of tendon slips are encountered to be important causative factors for this problem.¹ Finkelstein in 1930 reported first abnormal septation. The treatment is either an injection therapy or surgical decompression.²⁻⁶ The clinical implications of multiple tendinous slips insertion is first carpo-metacarpal arthritis or subluxation and its use as a tendon graft or failure of conservative therapy of DQT.⁶⁻⁹ This cadaveric study was designed to look for tendinous variations of APL in the Indian population.

METHODS

This cadaveric Study was done on 40 forearms in 20 cadavers available in Department of anatomy and

forensic medicine at our institute. The muscles of extensor compartments were dissected, extensor retinaculum split over first extensor compartment, tendons of APL and extensor pollicis brevis exposed after separating from tendon sheath. The APL tendon was identified and traced till its insertion. In each cadaver variation in number of tendon slips and site of attachment was noted. The trapeziometacarpal joint was opened and degenerative changes were macroscopically evaluated and noted.



Figure 1: Left wrist showing two abductor pollicis longus tendons.



Figure 2: Left wrist showing three abductor pollicis longus tendons.

RESULTS

There were 6 female and 14 male cadavers. The APL muscle was found with a single tendon in 2, double in 30, triple in 8. There were variations in the insertion of the APL tendon as well. In all hands, the APL tendon had insertion into the first metacarpal bone and in 20 hands (50%), it had second insertion into the trapezium.

Table 1: Gender wise distribution (N=20).

Gender	No. of cases	Percentage (%)
Male (M)	14	70
Female (F)	6	30
Total	20	100.0

There were 6 female (30 percent) and 14 (70 percent) male cadavers.

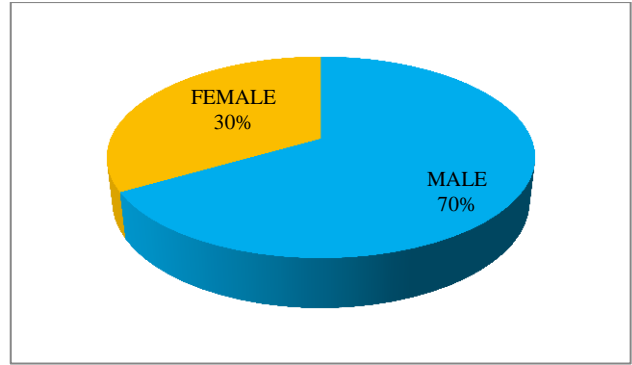


Figure 3: Gender wise distribution.

Table 2: Distribution according to tendon slips found (N=40).

No of tendon slips	Frequency	Percent
Single	2	5
Double	30	75
Triple	8	20
Total	40	100

The APL muscle was found with a single tendon in 2 (5 percent), double in 30 (75 percent), triple in 8 (20 percent).

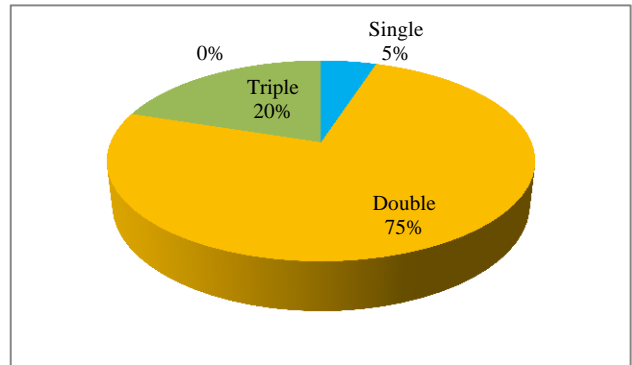


Figure 4: Distribution according to tendon slips found.

Table 3: Distribution according to insertion.

Insertion	Percentage (%)
Only first metacarpal	100
First metacarpal and trapezium	50

In all hands, the APL tendon had insertion into the first metacarpal bone and in 20 hands (50%), it had second insertion into the trapezium.

DISCUSSION

In human anatomy, the abductor pollicis longus (APL) is one of the extrinsic muscles of the hand. As the name implies, its major function is to abduct the thumb at the

wrist. Its tendon forms the anterior border of the anatomical snuffbox. The abductor pollicis longus lies immediately below the supinator and is sometimes united with it.

It arises from the lateral part of the dorsal surface of the body of the ulna below the insertion of the anconeus, from the interosseous membrane, and from the middle third of the dorsal surface of the body of the radius. Passing obliquely downward and lateralward, it ends in a tendon, which runs through a groove on the lateral side of the lower end of the radius, accompanied by the tendon of the extensor pollicis brevis.

The insertion is divided into a distal, superficial part and a proximal, deep part. The superficial part is inserted with one or more tendons into the radial side of the base of the first metacarpal bone, and the deep part is variably inserted into the trapezium, the joint capsule and its ligaments, and into the belly of abductor pollicis brevis (APB) or opponens pollicis.

An accessory abductor pollicis longus (AAPL) tendon is present in more than 80% of people and a separate muscle belly is present in 20% of people. In one study, the accessory tendon was inserted into the trapezium (41%); proximally on the abductor pollicis brevis (22%) and opponens pollicis brevis (5%); had a double insertion on the trapezium and thenar muscles (15%); or the base of the first metacarpal (1%).¹⁰

The anatomy of the first dorsal compartment varies greatly. The EPB may be absent in 5% to 7% of the population. When present, the EPB may have its own compartment. The APL often has multiple tendinous slips, and these may insert in varying locations.

Roy et al concluded that two slips of abductor pollicis longus (APL) and one of extensor pollicis brevis (EPB) is the most common arrangement in first dorsal compartment of the wrist with most common insertion of the APL on the radial side of the first metacarpal base than on the trapezium followed by abductor pollicis brevis, opponens pollicis and carpo-metacarpal joint.¹¹

The trapeziometacarpal joint is the second most common hand structure affected by arthritis, but due to the unique features of thumb range of motion, it represents the most common site for surgical treatment. Numerous hypotheses have been proposed to explain the pathogenesis of trapeziometacarpal arthritis including anatomic variation of joint structures, ligaments or supernumerary APL tendon insertions. However, the etiology remains unclear and one of the most intriguing theories is probably the role of APL supernumerary slips in the initiation and progression of the disease.

The recommended length of tendon used in TMC arthroplasty for treatment of osteoarthritis was 5 cm. The average length of the APL in our cadaveric specimens

was almost 6 cm. The use of the APL for extensor tendon reconstruction after chronic EPL ruptures also has been reported with good functional scores and patient satisfaction. The APL has been considered more relevant for thumb mobility and presumed more important for TMC stability.

An APL tendon duplicity has been widely documented appearing in 56% to 98.5% of hands. In our study, it appeared in 75%. When planning a reconstructive procedure of the hand, the use of preoperative ultrasound can provide useful information regarding the number of tendons and approximate dimensions.

CONCLUSION

Variation of APL muscle insertion in the Indian population and two or more tendinous slips attached commonly to the first metacarpal base and the trapezium may be the cause of treatment failure in DQT and cause of Trapeziometacarpal arthritis. Further studies needs to be done for further evaluation.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Bahm J, Szabo Z, Foucher G. The anatomy of de Quervain's disease. A study of operative findings: Int Orthop. 1995;19(4):209-11.
2. Bravo E, Barco R, Bullón A. Anatomic study of the abductor pollicis longus: A source for grafting material of the hand. Clin Orthop Relat Res. 2010;468:1305-9.
3. Melling M, Reihnsner R, Steindl M, Karimian-Teherani D, Schnallinger M, Behnam M. Biomechanical stability of abductor pollicis longus muscles with variable numbers of tendinous insertions. Anat Rec. 1998;250:475-9.
4. Glajchen N, Schweitzer M: MRI features in de Quervain's tenosynovitis of the wrist. Skeletal Radiol. 1996;25:63-5.
5. Aydinlioglu A, Tosun N, Keles P, Akpinar F, Diyarbakirli S. Variations of abductor pollicis longus and extensor pollicis brevis muscles: Surgical significance. Kaibogaku Zasshi. 1998;73:19-23.
6. Zingas C, Failla JM, Van Holsbeeck M. Injection accuracy and clinical relief of de Quervain's tendinitis. J Hand Surg Am. 1998;23:89-96.
7. Mahakkanukrauh P, Mahakkanukrauh C. Incidence of a septum in the first dorsal compartment and its effects on therapy of de Quervain's disease. Clin Anat. 2000;13:195-8.
8. Roh MS, Strauch RJ, Xu L, Rosenwasser MP, Pawluk RJ, Mow VC. Thenar insertion of abductor pollicis longus accessory tendons and thumb

- carpometacarpal osteoarthritis. *J Hand Surg Am*. 2000;25:458-63.
9. Schulz CU, Anetzberger H, Pfahler M, Maier M, Refior HJ. The relation between primary osteoarthritis of the trapeziometacarpal joint and supernumerary slips of the abductor pollicis longus tendon. *J Hand Surg Br*. 2002;27:238-41.
 10. Bravo E, Barco R, Bullón A. Anatomic Study of the Abductor Pollicis Longus: A Source for Grafting Material of the Hand. *Clin Orthop Relat Res*. 2010;468(5):1305-9.
 11. Roy AJ, Roy AN, De C, Banerji D, Das S, Chatterjee B, et al. A cadaveric study of the first dorsal compartment of the wrist and its content tendons: Anatomical variations in the Indian population. *J Hand Microsurg*. 2012;4:55-9.

Cite this article as: Jain RK, Mantri N, Mandlecha P. Variation of abductor pollicis longus tendons in cadavers. *Int J Res Orthop* 2018;4:417-20.