The Tendon of the Anatomical Snuffbox Exists in Numerous Configurations.

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ABSTRACT

Introduction: The muscles connected to the anatomical snuff box are crucial for stabilising the wrist. De Quervian’s Syndrome and tendinitis are conditions caused by morphological abnormalities in these muscles, which are often developing in nature. There is limited information available about the tendon types in the Nepalese population, despite studies showing distinct tendon-splitting patterns of the abductor pollicis longus (APL), extensor pollicis longus (EPL), and extensor pollicis brevis (EPB).

Methods: A routine dissection of 30 upper limbs from 15 cadavers was carried out according to Cunningham’s Manual of Practical Anatomy, Volume 1. Age estimation was not done, but all the cadavers in the department that had entire upper limbs were examined. The forearm’s flexor and extensor compartments were dissected. It was done to trace the muscle’s tendons up to their insertion. The investigation eliminated any upper limbs with fractures or wrist or forearm deformities.

Results: Seven upper limbs, out of 30, only possessed one tendon. All the upper limbs have a trapezium and the base of the first metatarsal bone where the APL was inserted. It was noted that neither EPB nor EPL had changed. APL and EPL did not split within a single osseo-fibrous tunnel in any specimen.

Conclusions: Anatomical information on the muscles’ fibres and their insertion at anatomical snuff boxes is provided in this study. When considering alterations at the wrist joint under pathological situations, these statistics could be considered.

INTRODUCTION

In the dorsum of the hand, there is a triangular depression known as the radial fossa, also known as the anatomical snuff box. If the thumb is extended, it is most easily visible at the level of the carpal bones. Historically, snuff (ground tobacco) was kept in a depression called a “snuffbox” before being inhaled via the nose.1 The EPL tendon forms the fossa’s medial (ulnar) edge, while the EPB and APL tendons form a lateral (radial) edge. The EPL tendon creates a firm boundary on the medial side of the fossa. The EPB and APL tendons offer support on the radial side. This area consists of the radial artery, a branch of the radial nerve as well as the cephalic vein crosses the roof of this area.2 The anatomical snuffbox has skeletal markers at its base. All of these are palpable when the thumb is extended and the hand is in an ulnar deviation: the radial styloid, the scaphoid bone, the trapezium, and...
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It has been demonstrated that the APL and the EPL have many tendon slips and various locations of sliding. This was clinically notable because it might predispose an individual to develop tendinopathy in one or both of these muscles. Furthermore, de Quervain’s syndrome, produced by stenosing tenosynovitis, is frequently linked to numerous tendons in the APL. Inflammation can occur, mainly due to misuse, especially during gripping or clutching. Patients with this illness have pain on the wrist’s thumb side. This is a primary symptom. The pain can come on gradually or suddenly. It may begin at the wrist and progress up the forearm. When the hand and thumb are in use, the pain is typically worse. This is particularly true when firmly grabbing, lifting, or twisting objects. The structures seen at the anatomical snuffbox come in a variety of variants and clinical conditions. It is possible to transfer these muscles and their dividing tendons. Therefore, the study on several tendons of anatomical snuff boxes has been chosen with the expectation of supporting the clinical investigation and appropriate surgical intervention of tenosynovitis and synovitis.

METHODS

This observational study was conducted at Chitwan Medical College. Data collection was done at Chitwan Medical College from 15th September 2022 to 10th February 2023 and analysis and report writing was done at Griffith University. Ethical approval was obtained from CMC-IRC/079/080-056.

Routine dissection of Fifteen (15) cadavers (30 Upper Limbs), was undertaken as per described procedure in Cunningham’s Manual of Practical Anatomy VOL 1 Upper and Lower limb. We selected all cadavers which were in the department for the study and generally used to teach undergraduates. All intact upper limbs were studied, and age estimation was not done. The limbs were numbered from 1 to 15 on the right and left upper limbs. The extensor and flexor compartment of the forearm was dissected. Tracing of the muscles and its tendon up to the insertion was done. The upper limbs with fractures or any deformity at the forearm and wrist were excluded from the study. The parameters noted were tendons of APL, EPB and EPL. Photographs were taken as a record. Their origin, Insertion, the compartment they pass through, any anomaly or deformity and their nerve supply were noted.

RESULTS

On dissecting the skin, the superficial fascia and deep fascia muscle layer were exposed. An anatomical snuff box was identified after identifying the muscles forming its boundary.

All the specimens (30 upper limbs from 15 cadavers) had all three muscles present in them, namely APL, EPB and EPL. The radial artery anatomical snuff box content was found in all specimens.
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Table 1: Showing the muscles with several tendons present in them.

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Single Tendon</th>
<th>Multiple Tendon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abductor Pollicis Longus (APL)</td>
<td>7 upper Limb</td>
<td>23 Upper Limb</td>
</tr>
<tr>
<td>Extensor Pollicis Brevis (EPB)</td>
<td>30 Upper Limb</td>
<td>Nil</td>
</tr>
<tr>
<td>Extensor Pollicis Longus (EPL)</td>
<td>30 Upper Limb</td>
<td>Nil</td>
</tr>
</tbody>
</table>

The APL in all the upper limbs was inserted into the base of the first metatarsal bone and trapezium. The fibres came out of the posterior surface of the radius and ulna with the interosseous membrane between them. No variation was found in EPB and EPL. We reported that all the muscle fibres of EPB originated from the ulna distal to APL, the distal surface of the radius along with the interosseous membrane in between. Similarly, its fibres are inserted into the posterior aspect of the base of the proximal phalanx of the thumb. In addition, all EPL originated from the middle third of the ulna and the interosseous membrane between them. The fibres were inserted at the base of the distal phalanx of the thumb. We found a single Osseofibrous tunnel without separation between APL and EPB in all specimens.

DISCUSSION

The tendon of APL is separated into three strips during the early stages of development, with the centre strip placed into the trapezium, and the frontal strip connected to the first metacarpal bone. When new connections with the APB are made, the palmar strip, which is attached to the opponens pollicis, is cut off.5 Such persistent tendinous patterns may eventually result in the observation of several tendons.9 In the present study of radial fossa, we attempted to find out the variation of the tendon of the APL. We recorded that APL has numbers of the splitting of the tendons from 2 to 5. The splitting of the multiple tendons of the APL is also seen in previous studies conducted by Khan M, Paul S, Thwin SS, Gonzalez MH, Tewari J, and Nishijo K. Kham M et al10 in the study observed APL divides into 5 sections shortly after the existing first compartment. Also, Paul S et al11 reported APL to have three tendons. The findings of his study are like our findings.

A study by Gonzalez MH et al12 on 66 cadaveric hands reported 38 multiple slips of APL, and trapezium and thenar were found to have an accessory slip inserted. We found similar results to theirs. Thwin SS et al12 reported up to 14 tendons of APL in the cadaveric study. Likewise, Tewari J et al in the cadaveric study for APL reported up to 4 tendons. Additionally, Nishijo et al13 have noted duplicated EPL tendons that entered the interphalangeal joint and passed medial to the APL.

Nayak SR et al14 in their study on the variation and clinical significance of EPB reported more than 1 tendon in 23 upper limbs. Ravi PK et al15 outlined solitary tendons in 94.8%, a double tendon in 2.6%, and 3 tendons in 1.3% of limbs. Their finding is against ours. We found a single tendon of EPB in all studied specimens. This variation might be developmental, or the number of the sample.

Thwin SS et al16 documented 2 tendons of the EPL in their study. They also reported 2 separate tunnels instead of single in the first extensor compartment. Their finding is against the observation of ours. In our study, we only mentioned one first extensor compartment and one tendon of the EPL. This difference might be developmental.

LIMITATIONS

An increased sample size would have been better for commenting on incidence. Furthermore, because the investigation was conducted using free upper limbs, the laterality and predominance of one gender could not be determined.

CLINICAL IMPLICATIONS

Making a precise diagnosis in situations of swelling and pain on the hand requires knowledge of these aberrant muscles and their clinical presentation.8 When executing hand surgeries, as well as when thinking about tendon transfer and tendon repair surgeries, understanding these abnormal muscles and their tendons is crucial.16 Because our study dissected the upper limb, several tendons of the APL were seen in the anatomical snuff box. When doing reconstructive hand procedures on the dorsolateral side of the hand and treating de Quervian’s Syndrome, anatomical understanding of this variance may be crucial therapeutically. Long-term anthropological, radiological, and academic investigations may benefit from this variety in the tendons and muscles.

CONCLUSIONS

The variation of the muscles in the anatomical snuff
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The anatomical snuffbox is common. The clinically relevant diagnosis of the anatomical snuffbox is de Quervain tenosynovitis. The APL and the muscle known as the EPB, both of which are lateral borders of the anatomical snuffbox, are both affected by first dorsal compartment stenosis caused by De Quervain tenosynovitis, a tendinopathy. It is clinically relevant when discomfort is palpable inside the boundaries of the anatomical snuffbox. Scaphoid fractures, which are frequently misdiagnosed, account for two-thirds of all fractures of the carpal bones. A common type of injury occurs when someone falls onto their outstretched hand with a pronated and deviated ulnar axis.

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REFERENCES