

Anatomic variation of the first dorsal compartment in surgical treatment of DeQuervain's disease

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Abstract

Objective: Anatomic variation of first dorsal compartment including variability of the abductor pollicis longus tendon, extensor pollicis brevis tendon and secondary osseo-fibrous canal help surgeons to treated DeQuervain's disease.

Material and methods: 40 patients with DeQuervain's disease were included. All patients previously receive treatment either corticosteroid injection or surgical release of first dorsal compartment from different hospitals. All patients have still positive Finkelstein's test. In this study we re-explore, and particular look for the origin of the accessory tendon and of the presence or absence of a secondary osseo-fibrous canal within the first extensor compartment.

Results: An accessory tendon of the abductor pollicis longus was found in (31)77% of wrists, though in only (5)12% wrists the accessory tendon found in a separate fibrous canal. In the remainder the abductor pollicis longus with all its accessory tendons of insertion occupied a common canal. A separate compartment for the extensor pollicis brevis was noted in (10)25% of cases.

Conclusion: We conclude that knowledge of anatomic variation of first dorsal compartment prevent failure in the treatment of DeQuervain disease.

Keywords: DeQuervain disease, abductor pollicis longus (APL), extensor pollicis brevis (EPB), local corticosteroid injection, surgical release of first dorsal compartment

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Introduction:

Stenosing Tenosynovitis of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) in the first extensor compartment of the wrist has been recognised since DeQuervain reported the condition in 1895.¹ DeQuervain's disease is a common cause of wrist pain and disability. Despite great interest in the condition, its aetiology and pathology remain uncertain. In histopathology, DeQuervain's disease is not characterised by inflammation, but by thickening of the tendon sheath and most notably by the accumulation of muco-polysaccharide, an indicator of myxoid degeneration.² Treatment strategies include immobilization, corticosteroid injections, and operative release.^{3,4} Operations designed to relieve the symptoms of DeQuervain's disease involve

surgical de-compression of the osseo-fibrous canal in which the tendons lie.⁵ This canal, the first of the extensor tendon compartments at the wrist, is usually said to contain both these tendons in their respective synovial sheaths. Failure in this operation is common and may be related to anatomical variations in these two tendons. Such variations have been known for many years, Quain (1892) observing that the tendon of the abductor pollicis longus was the commonest of all the extensor tendons to vary, and Tillaux (1882) noting that the tendons of the abductor pollicis longus and extensor pollicis brevis might be found lying in separate fibrous compartments. Numerous anatomic and surgical studies have shown great variability in tendon structure and organization of the first dorsal compart-



Figure 1:



Figure 2:



Figure 3:



Figure 4:

ment.^{6,8} Septations within the osteofibrous tunnel and slip multiplicity of the abductor pollicis longus (APL) have all been raised as possible causes of DeQuervain's tenosynovitis,⁷ or causes for failed steroid injections.⁹ Stein (1951) found in a series of eighty-four wrists that 68 percent exhibited an accessory tendon of the abductor pollicis longus whereas only 4 percent exhibited a similar accessory tendon of the extensor pollicis brevis.¹⁰ Keon-Cohen (1951) observed in a series of 66 dissected forearms that 33 percent showed the extensor pollicis brevis tendon to occupy a separate compartment.¹¹ De-compression of the main osseo-fibrous canal may not relieve the symptoms of the disease if an accessory tendon remains unrecognized and is left compressed in its own fibrous canal and the aim of our study is to properly recognize the presence of these accessory tendons and in particular the presence or absence of a separate osseo-fibrous compartment in the success of treatment.

Material and Methods:

The study conducted in Jinnah Postgraduate Medical Centre, Department of Orthopaedic, Ward 14, from March 2011 to February 2015, 40 patients with DeQuervain's disease were included. All patients previously received either corticosteroid injection or surgical release of the first dorsal compartment from different hospitals. All patients included in the study had clinical evidence of DeQuervain's disease with a positive Finkelstein test.¹² There were 26 women and 14 men. The average age at operation was 47.4 years (range 22–76). The right wrist was involved in 23 cases, the left in 17 cases. Indication for re-exploration of DeQuervain's disease was unsuccessful treatment with one or maximum two steroid injections and inadequate surgical release. The exclusion criteria include evidence of disease like Gout, Rheumatoid Arthritis, pregnancy and previous history of Trauma.

Surgical Technique: All operations were done under tourniquet control with local infiltration anaesthesia under outpatient conditions. A longitudinal incision (3–4 cm length) was made over the first compartment (figure-1). The radial sensory nerve branches and veins were identified and protected. The sheath of the abductor pollicis longus and extensor pollicis brevis was identified and partially resected (figure-2). The tendons then were identified and the compartment was explored for anatomical variations. The extensor pollicis brevis (EPB) and abductor pollicis longus (APL) were inspected for slip multiplicity. If a septum was present it was also excised (figure-3,4). The tourniquet was then deflated and haemostasis established. The skin closure done, and a dressing was applied. Movement was encouraged immediately. No splint was used post-operatively.

Results:

When the first dorsal compartment was opened for inspection. An accessory tendon of the abductor pollicis longus was found in (31) 77% of wrists, with 1, 2, 3, or 4 slips in 7%, 19%, 27%, 23% respectively, though in only (5) 12% of wrists the accessory tendon to be found lying in a separate fibrous canal. In the remainder the abductor pollicis longus with all its accessory tendons of insertion occupied a common canal, separate compartment for the EPB was noted in (10) 25% of the patients. The EPB always had 1 slip. There were 6 post-operative complications, including one superficial wound infection, one delayed wound healing, and four transient lesions of the sensory branch of the radial nerve. A successful outcome defined as absence of triggering and pain, both subjectively and on examination, was achieved in all cases. All patients had complete relief of symptoms and returned to their normal daily activities. Finkelstein's test was negative in all cases. There were no sensory

deficits of the superficial radial nerve. 4 patients had mild pain but normal function of the hand not related to the operative procedure. In all cases a cosmetically acceptable scar could be found.

Discussion:

The evaluation and treatment of DeQuervain's teno-synovitis has evolved since the description by DeQuervain in 1895. Non-operative treatment was felt early on to be unsuccessful, with surgical operative de-compression of the first dorsal compartment being uniformly recommended.¹³⁻¹⁵ Meanwhile, several authors published anatomical variations of the first extensor compartment. The accurate injection of methylprednisolone into the sheath of both the extensor pollicis brevis and abductor pollicis longus tendon was considered very effective. According to Zingas,¹⁶ the extensor pollicis brevis compartment was often missed in injections. Other authors advocated the use of an immobilisation splint involving rigid fixation of the thumb in relative abduction, allowing time for the teno-synovitis in the first dorsal compartment to resolve.¹⁴ In 1981, Belsole¹⁷ reported 36 complications in 19 patients after release of the first extensor compartment for DeQuervain disease. Of these 36 complications, eight were related to subluxation of the tendon, eight to injury of the nerve, and seven to inadequate decompression.^{17,18} A septum between the abductor pollicis longus tendon and the extensor pollicis brevis (EPB) tendon in the first extensor compartment is frequently encountered during surgical treatment of DeQuervain's disease. In 1998, Yuasa¹⁹ postulated that DeQuervain's disease is secondary to EPB entrapment. The most important complication is inadequate decompression found in cases with a septum when only the APL tendon is de-compressed and the EPB tendon remains compressed.^{13,19,20} A likely cause of incomplete resolution of tenosynovitis is anatomical inconsistency.⁸ It is suspected that the first dorsal compartment of the wrist is probably the site of most numerous variations in tendon structure and organization in the upper limb.⁶ A thorough understanding of the common anatomical variations within the first

extensor compartment is also important for the operative treatment of DeQuervain's teno-synovitis. Previous anatomic studies of the first dorsal compartment revealed a significant number of tendon variations.^{6,8} The standard arrangement of tendons refers to a single APL inserting into the base of the metacarpal of the thumb or into the trapezium while the EPB inserts into the proximal phalanx.⁷ Aktan⁶ reported that in 85.4% of wrists, the number of tendon slips differed from the standard. Septation was found in 10% of the wrists. The septum was between the APL and the EPB tendons. Kulthanan²¹ demonstrated super numerary APL tendons in 89%, duplicated EPB tendons in 2%, and septation in 37% of cadaveric wrists. Our study confirms the variability noted in previous studies, with accessory APL tendons in 77% and a single intra-compartmental septation in 25% of the specimens. In contrast, no variability was present with regard to the EPB tendon. Given the anatomic variability demonstrated in this study and others,^{7,8} we believe that septations within the osteofibrous tunnel and slip multiplicity of the APL are possible causes of DeQuervain's disease⁷ and causes for failed steroid injections⁸ and inadequate surgical release.

Conclusion:

Anatomical Variations found in the tendons of the APL and EPB muscles as they lie in the first extensor compartment of the wrist. Such variations include re-duplication of the APL tendon and rarely the EPB tendon. An accessory tendon of APL occasionally lie in a separate osseofibrous canal. It is not unusual to find the APL and EPB tendons lying in separate compartments, because an accessory fibrous septum is subdividing the first extensor compartment into two parts. Furthermore, the EPB tendon may also lie in separate compartment. Such variation lead incomplete surgical decompression and could reasonably be linked with the failure rate for this particular operation for de Quervain's disease.

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Role and contribution of authors:

Dr Adeel Ahmad, collected the data and references and did the initial write up.

Dr Muhammad Imran Javed, collected the data and references, went through the article, and made some changes

Dr Muhammad Saleem Akhtar, critically review the article and did changes

Dr Muhammad Imran Mangi, helped in collecting the data and references and helped in discussion writing.

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