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# Surgical anatomy of the first extensor compartment: A systematic review and comparison of normal cadavers vs. De Quervain syndrome patients

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## KEYWORDS

De Quervain's tenosynovitis;  
First extensor compartment anatomy;  
Tendinopathies;  
De Quervain disease

**Summary** *Purpose:* De Quervain syndrome or tenosynovitis is a common wrist pathology caused by stenosing tenosynovitis of the first dorsal compartment. Multiple studies have demonstrated significant anatomic variation within the first extensor compartment. *Methods:* The terms "De Quervain's tenosynovitis" and "first extensor compartment anatomy" were comprehensively searched using the PubMed, MEDLINE, and Cochrane database. The presence of a septum within the first dorsal compartment, the number of APL (abductor pollicis longus), and EPB (extensor pollicis brevis) tendon slips were identified. *Results:* A total of 574 articles were identified on initial search, of which 21 met inclusion criteria. There were 1901 normal cadaver specimens and 470 surgically treated De Quervain disease patients, whose data were available. A septum was present in 43.7% of normal cadavers versus 62.2% De Quervain patients with 58.5% (327 of 559) of the septi characterized as incomplete. There was a difference in the number of APL tendons with a single APL tendon slip noted in 18.3% of normal cadavers (200/1096) versus 27.2% of De Quervain patients (87/230). There was a difference in the number of EPB tendons between the normal cadavers and De Quervain's wrists with 2 or more EPB tendinous slips observed in 5.9% of normal cadavers compared with 2.9% of De Quervain patients. *Conclusion:* Significant anatomic variability exists within the first extensor compartment. Patients with De Quervain disease were more likely to have a septum dividing the compartment and a single slip of APL. These variations are clinically relevant in the pathophysiology and

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treatment of De Quervain's tenosynovitis.

*Type of Study:* Prognostic studies.

*Level of Evidence:* Level III.

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## Introduction

De Quervain syndrome also known as De Quervain's tenosynovitis arises from inflammation of the first extensor compartment that is exacerbated by the mechanical interaction of extensor pollicis brevis (EPB) and the abductor pollicis longus (APL) tendons within the narrow confines of the first extensor compartment. The main presenting symptom is pain over the radial styloid process worsened by ulnar wrist deviation. Initial treatment is conservative consisting of avoiding repetitive movements of the thumb, splinting, and corticosteroid injections into the first extensor compartment. Surgical treatment is considered if symptoms fail to improve.

The standard anatomy of the first extensor compartment initially described the APL and EPB tendon as lying in a unified fibro-osseous canal with single insertions to the first metacarpal and proximal phalanx, respectively.<sup>1</sup> However, subsequent studies have shown that this compartment is among the most highly variable anatomical spaces in the hand region. The purpose of this study was to perform a systematic literature review of the anatomical variations in the first extensor compartment and to define any characteristics that are related to De Quervain's disease.

## Methods

A systematic review of the literature was performed from 1951 to 2015 using the PubMed, MEDLINE, and Cochrane database. The search terms included "De Quervain's tenosynovitis" and "first extensor compartment anatomy." All studies that reported prospective data, retrospective data, case series data, and cadaver dissection data were included. Studies were excluded if the study was not published in English and those that did not comment on specific anatomic characteristics of the APL tendon, EPB tendon, or septum within the first extensor compartment (Figure 1). The reference list of all included studies was further examined to identify any additional relevant studies. All included studies were categorized as cadaver or clinical articles. All the cadaver studies included were of normal wrists without any known history of De Quervain's disease. All the case series were of patients who were diagnosed with De Quervain's disease based on clinical and physical examinations and imaging findings and who subsequently underwent surgical treatment. The main variables examined included the presence of a septum within the first extensor compartment and the number of APL and EPB tendon slips present.

## Statistical analysis

We used the Pearson chi-square test to assess the significance of the difference in the number of subcompartments and APL and EPB tendon slips between normal cadavers and patients with De Quervain syndrome. Statistical significance was set at  $p < 0.05$ .

## Results

Initial search returned 574 articles, 15 of which were suitable for inclusion in the study. Examining the reference list of the relevant studies identified six additional studies. Pooling all the studies resulted in 1901 cadavers and 470 surgical patients with De Quervain's tenosynovitis for review.

### First extensor compartment anatomy

The presence of a septum dividing the first extensor compartment was examined in 18 cadaver studies for a total of 1857 wrists and seven case series with 470 De Quervain's patients [Table 1]. Of the normal wrists, 57% (1060/1901) had a single compartment compared to only 41% (191/470) of De Quervain's patients ( $p < 0.00001$ ). Seven cadaver studies differentiated between complete and incomplete septum and demonstrated that 59% (327/559) of wrists with a septum present had an incomplete septum.

### APL tendon anatomy

The anatomy of the APL tendon was delineated in 12 cadaver studies with 1096 normal wrists and five case series with 320 De Quervain's patients. All studies reported the number of APL tendon slips and are summarized in Table 2. Three studies only distinguished between the presence of a single APL tendon slip and multiple tendon slips, while the remaining studies specified the exact number of APL tendon slips. A statistical difference in the number of APL tendons between the normal cadavers and De Quervain's wrists was present ( $p = 0.0005$ ). Of normal cadaver wrists, 18% (200/1096) had a single APL tendon slip compared with 27% (87/320) of De Quervain's wrists. Two of the studies reported up to six separate APL tendon slips (0.8%).

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