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De Quervain's Tenosynovitis: Effective Diagnosis and Evidence-Based Treatment

Jenson Mak

Abstract

De Quervain's tenosynovitis (DQT) is a repetitive stress condition located at the first dorsal compartment of the wrist at the radial styloid. The extensor pollicis brevis (EPB) and abductor pollicis longus (APL) tendons and each tendon sheath are inflamed and this may result in thickening of the first dorsal extensor sheath. Workers who perform repetitive activities of the wrist and hand and those who routinely use their thumbs in grasping and pinching motions in a repetitive manner are most susceptible to DQT. Conservative treatments include activity modification, modalities, orthotics, and manual therapy. This chapter identifies, in an evidence base manner through the literature, the most effective diagnostic measures for DQT. It also examines the evidence base on (or lack thereof) the treatment or treatment combinations to reduce pain and improve functional outcomes for patients with DQT.

Keywords: De Quervain's tenosynovitis, diagnosis, treatment, workplace, evidence-based

1. Introduction

In 1893, Paul Jules Tillaux described a painful crepitus sign (Aïe crépissant de Tillaux)—tenosynovitis of the adductor and the short extensor of the thumb. In 1894, Fritz de Quervain, a Swiss surgeon, first described tenosynovitis on December 18, 1894, in Mrs. D., a 35-year-old woman who had severe pain in the extensor muscle region of the thumb, excluding tuberculosis.

"It is a condition affecting the tendon sheaths of the abductor pollicis longus, and the extensor pollicis brevis. It has definite symptoms and signs. The condition may affect other extensor tendons at the wrist" [1].

Patients with DQT have difficulty gripping objects and performing their daily activities. De Quervain's tendinopathy affects the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons in the first extensor compartment at the styloid process of the radius. It is characterized by pain or tenderness at the radial side of the wrist. Although de Quervain's tendinopathy is often attributed to overuse or repetitive movements of the wrist or thumb, the cause is generally unknown.

2. Epidemiology

De Quervain's tenosynovitis (DQT) is a common cause of wrist pain in adults and is the second most common entrapment tendinopathy in the hand following trigger finger. It usually occurs in middle-aged individuals and is around 3× more common in women (~80% of cases). It is most common among women between the ages of 30 and 50 years of age, including a small subset of women in the postpartum period [2]. These women tend to develop symptoms about 4–6 weeks after delivery. In a large analysis of a young active population of military personnel, women again had a significantly higher rate of de Quervain's tenosynovitis at 2.8 cases per 1000 person-years, compared to men at 0.6 per 1000 person-years (almost 5×). Age greater than 40 was also a significant risk factor, with this age category showing a rate of 2.0 per 1000 person-years compared to 0.6 per 1000 in personnel under 20 years. There was also a racial difference, with blacks affected at 1.3 per 1000 person-years compared to whites at 0.8, in this population [3].

With regard to work, Stahl found that in 189 patients surgically treated for DQT vs. 198 patients with wrist ganglia (WG) (controls), there was no significant difference between DQT vs. WG found after subgrouping professional activities (manual labor: 18 vs. 26%, respectively, $p = 0.23$). In addition, there was no asymmetric distribution of comorbidities, wrist trauma, forceful or repetitive manual work, or medication observed, and it was concluded that neither heavy manual labor nor trauma could be shown to be predisposing risk factors for DQT (**Figure 1**). Most cases of DQT, however, are associated with overuse, and, local trauma can also precipitate the condition [4].

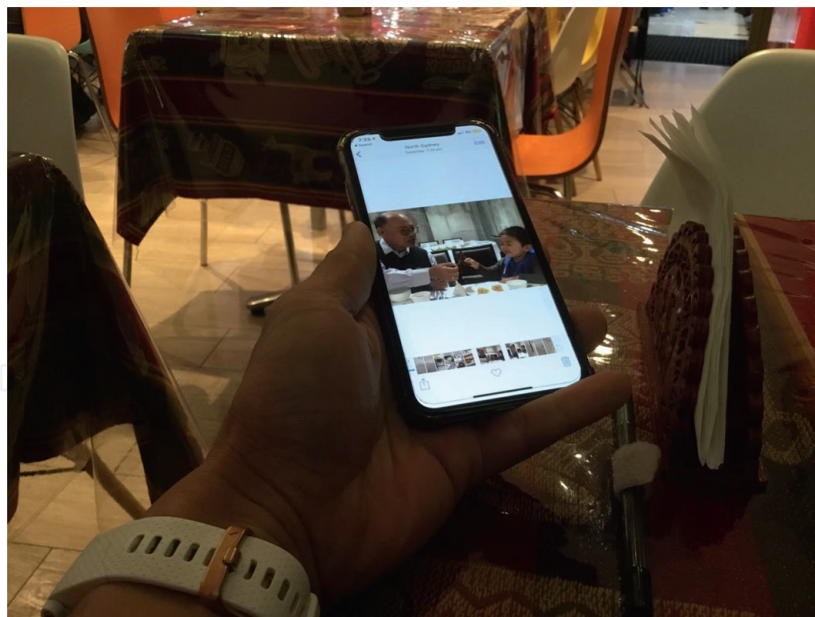


Figure 1.

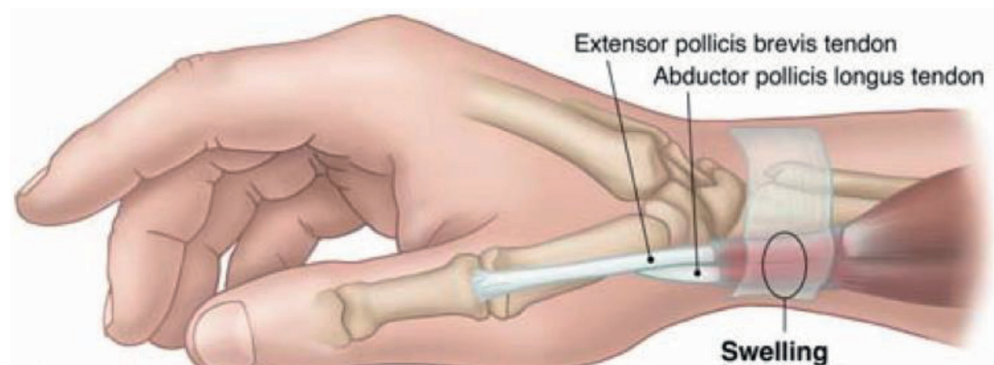
De Quervain's tenosynovitis (DQT) is one of the most common work-related upper limb musculoskeletal disorders especially in the age of smartphones, tablets and laptop devices.

3. Pathophysiology

The etiology of de Quervain's tenosynovitis (DQT) is not well understood. In the past, it was frequently attributed to occupational or repetitive activities involving postures that maintain the thumb in extension and abduction. As an example, it has been thought that new mothers are at risk postpartum due to repetitive motion

of hands required to lift and hold newborns. Hormonal causes and fluid retention are another plausible explanation. The evidence to support etiologic hypotheses is limited and is largely based on observational data. The histopathology does not demonstrate inflammation but rather myxoid degeneration (disorganized collagen and increased cellular matrix) in patients referred for surgery [5].

DQT affects both the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) at the point where they pass through a fibro-osseous tunnel (the first dorsal compartment) from the forearm into the hand. These tendons are responsible for bringing the thumb away from the hand as it lies flat in the plane of the palm (i.e., radial abduction). Similar to trigger finger (or stenosing flexor tenosynovitis), this disease involves a noninflammatory thickening of both the tendons and the tunnel (or sheath) through which they pass. The APL and EPB tendons are tightly secured against the radial styloid by the overlying extensor retinaculum which creates a fibro-osseous tunnel. Thickening of the retinaculum and tendons from acute or repetitive trauma restrains normal gliding within the sheath. This causes inflammation and further edematous thickening of the tendon exacerbating the local stenosing effect. Microscopically, there are inflammatory cells found within the tendon sheath.



In ~10% of patients, there is an intertendinous septum between APL and EPB. The absence of a septum is associated with very high rates (almost 100%) of complete symptom resolution with conservative management. Presence of an intertendinous septum increases the likelihood that surgical management will be required.

Stahl et al. [6] reviewed in a meta-analysis of 80 articles of an association between DQT and (1) repetitive, (2) forceful, or (3) ergonomically stressful manual work suggesting an odds ratio of 2.89 (95% CI, 1.4–5.97; $p = 0.004$). The analysis, however, found no evidence to support the Bradford Hill criteria for a causal relationship between de Quervain's tenosynovitis and occupational risk factors.

4. Evidence-based review

While there have been several multidisciplinary treatment guidelines published [7], they are consensus-based rather than evidence-based. This review seeks to address this issue and identify any gaps in research for the investigation and treatment of DQT.

Systematic search of MEDLINE, CINAHL and EMBASE for articles published from September 2014 to August 2018, and the Cochrane Database of Systematic Reviews (most recent issue searched—Issue 2, 2018). Randomized controlled trials,

meta-analyses, and reviews of all aspects of diagnoses and treatment for DQT among participants were limited to those aged 18 years.

All studies were reviewed independently by the author, who recorded individual study results, and an assessment of study quality and treatment conclusions was made according to evidence-based protocols.

Out of a total of 72 articles from PUBMED for DQT diagnosis, we found 10 articles satisfying the research criteria. There were no suitable Cochrane review articles.

Out of a total of 95 articles from PUBMED for DQT treatment, we found 20 articles satisfying the criteria. There were no suitable Cochrane review articles.

5. Evidence-based DQT diagnosis

5.1 Clinical examination diagnosis

The Finkelstein test (**Figure 2**) is named after Harry Finkelstein (1865–1939), an American surgeon who first described it in 1930. It is a clinical test used to assess the presence of DQT in people with wrist pain. It is performed by grasping the patients thumb and deviating the hand in the ulnar direction. If a sharp pain occurs along the distal radius, this is considered to make DQT likely.

Eichhoff's test (**Figure 3**) is often wrongly named as Finkelstein's test. Eichhoff's test consists of grasping the thumb in the palm of the hand while the wrist is ulnar deviated, and the test is positive in the presence of pain over the radial styloid process during lunar deviation of the wrist.

The wrist hyperflexion and abduction of the thumb (WHAT) test (**Figure 4**) revealed greater sensitivity (0.99) and an improved specificity (0.29) together with a slightly better positive predictive value (0.95) and an improved negative predictive value (0.67) compared with Eichhoff's test in one study [8]. Moreover, the study showed that the wrist hyperflexion and abduction of the thumb test was very valuable in diagnosing dynamic instability after successful decompression of the first extensor compartment.



Figure 2.
Finkelstein's maneuver as described in 1930: the examiner pulls the thumb in ulnar deviation and longitudinal traction to exacerbate the symptoms of de Quervain's disease.



Figure 3.
Eichhoff's maneuver described in 1927, commonly confused with Finkelstein's test described in 1930.



Figure 4.
WHAT test: active testing by shearing the tendons of the first extensor compartment against the palmar distal edge of the pulley.

5.2 Radiological diagnosis

5.2.1 Plain radiograph

Plain radiographs are nondiagnostic of the condition but may show nonspecific signs and can help exclude other causes of pain such as fracture, carpometacarpal arthritis, and osteomyelitis. Signs include [9]:

- Soft-tissue swelling over the radial styloid
- Focal abnormalities of the radial styloid including cortical erosion, sclerosis, or periosteal reaction

5.2.2 Ultrasound

Ultrasound is very often diagnostic. Findings include:

- Edematous tendon thickening of APL and EPB at the level of the radial styloid (compare with the contralateral side)
- Increased fluid within the first extensor tendon compartment tendon sheath

- Thickening of overlying retinaculum and the synovial sheath
- Peritendinous subcutaneous edema resulting in a hypoechoic halo sign
- Peritendinous subcutaneous hyperemia on Doppler imaging

It is important to assess for an intertendinous septum which can usually be identified if present. Ultrasound is often used to guide corticosteroid injections into the tendon compartment to treat the condition [10].

- Using B-mode ultrasound as standard, shear wave elastography (SWE) as diagnosis of de Quervain's tenosynovitis has 95% specificity and 85% sensitivity in diagnosing DQT.
- In addition, ultrasonic characteristics including a cutoff value of the extensor retinaculum for diagnosing DQT was 0.45 mm (sensitivity 96.3%, specificity 93.3%). Bony crests on the radial styloid were found in all cases of the presence of the intracompartmental septum [11].

5.2.3 MRI

MRI is very sensitive and specific and useful for detecting mild disease where ultrasound may be equivocal. The presence or absence of intertendinous septum can be assessed. Findings include:

- Tenosynovitis
 - a. Increased fluid within tendon sheath (high T2, low-intermediate T1)
 - b. Debris within sheath (intermediate T1 signal)
 - c. Thickened edematous retinaculum
 - d. Peritendinous subcutaneous edema
 - e. Peritendinous subcutaneous contrast enhancement
- Tendinosis
 - a. Tendon enlargement maximal at radial styloid and often greater at the medial aspect of the tendon
 - b. Slightly increased intratendinous T1 and T2 signal compared to other tendons
 - c. Striated appearance of tendons due to multiple enlarged slips
- Longitudinal tendon tear
 - a. Linear high T2 signal due to fluid within the split
 - b. More common in APL

5.2.4 Ultrasound-guided injections and prognosis in DQT

When comparing ultrasound and clinical characteristics of the operated and nonoperated wrists, it was found that patients with a high baseline visual analogue scale, with all positive clinical tests and with a persistent intracompartmental septum, had a significantly higher risk of failure following conservative treatment [12].

6. Evidence-based DQT therapy

A recent review article by Huisstede et al. [13] found (1) moderate evidence for the effect of corticosteroid injection on the very short term for DQT and (2) moderate evidence that a thumb splint as additive to a corticosteroid injection seems to be effective in the short term and midterm.

6.1 Ultrasound-guided partial release and simultaneous corticosteroid injection of DQT

One prospective study of 35 patients found that ultrasound-guided partial release and simultaneous corticosteroid injection using a 21-gauge needle was feasible in current practice, with minimal complications [14].

6.2 Corticosteroid injection (CSI)/CSI + splint for DQT

Prospectively randomized patients treated with either corticosteroid injection (CSI) alone were compared with CSI with immobilization [15]. Radial-sided wrist pain, first dorsal compartment tenderness, and positive Finkelstein test were used to define DQT. Pain score of 4 or higher on a visual analogue scale (VAS) was utilized for inclusion. Followed at 3 weeks and 6 months for further evaluation, resolution of symptoms and improvements in VAS and Disabilities of the Arm, Shoulder, and Hand (DASH) scores were assessed to evaluate treatment success. This small prospective controlled study (on 20 patients) found that immobilization of 3 weeks following injection increased costs, may hinder activities of daily living, and did not contribute to improved patient outcomes in this study.

Contrasting this, Awan et al. [16] found in a randomized controlled trial of 30 patients with established DQT that the use of therapeutic ultrasound and spica splint together is more effective than using therapeutic ultrasound alone in the conservative management over 6 months.



However, Cavaleri et al. [17] in an earlier review of six studies confirmed combined orthosis/corticosteroid injection approaches are more effective than either intervention alone. It was found that significantly more participants were treated successfully when combined orthosis/corticosteroid injection approaches were compared to (i) orthoses (RR 0.53, 95% CI 0.35–0.80) and (ii) injections alone (RR 0.76, 95% CI 0.64–0.89).

6.3 Surgical treatment for DQT

A follow up of 89 patients who underwent surgical treatment with the Le Viet technique with a follow-up of 9.5 years, were favorable, with total regression of functional impairment in 85% of cases and a satisfaction rate of 97.5%, with no cases of tendon dislocation, neuroma, or recurrence [18].

7. Conclusion

De Quervain's tenosynovitis (DQT) is one of the most common forms of stenosing tenosynovitis and is a common workplace injury. Diagnosis is usually clinical using either the Finkelstein's test, Eichhoff's test, and/or the wrist hyperflexion and abduction of the thumb (WHAT) test. If required, the single most useful and accurate investigation is a high-resolution ultrasound scan. This evidence-based review identified a clear approach to treatment of DQT including nonsurgical (therapeutic ultrasound with or without orthoses) and surgical approaches. However, we found that more high-quality RCTs are still needed to further stimulate evidence-based practice, especially related to work-related disorders.



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Author details

Jenson Mak^{1,2,3,4*}

1 Rehabilitation Therapies Unit, Gosford Private Hospital, Australia

2 Healthy Ageing: Mind & Body, Sydney, Australia

3 University of Newcastle, Australia

4 John Walsh Centre for Rehabilitation, University of Sydney, Australia

*Address all correspondence to: jenson.mak@gmail.com

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