

Definition

De Quervain's tenosynovitis involves the first of the six dorsal compartments of the wrist, which contains the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons (Fig. 25.1). These tendons run beneath a sheath over the dorsal radial styloid process laterally to the anatomic snuff box. Tendons are covered by a synovium, which allows them to slide through the fibrous sheath [1]. Common anatomical variants exist, including up to 58% having a distinct EPB and APL compartment and "aberrant" or duplicated tendons, typically the APL (>50%). More proximal and medial insertions into the trapezium, the abductor pollicis brevis (APB) muscle, the opponens pollicis muscle, or the muscle fascias can also exist. The EPB is considered a "late" tendon phylogenetically, being absent in approximately 5% of the population. Persistent pain may be an issue if these aberrant variations in anatomy are not recognized at initial diagnosis and accounted for in subsequent treatment.

Edema of the tendons and thickening of the sheath with repetitive microtrauma and friction during certain thumb and wrist motion lead to stenosing tenosynovitis referred to as De Quervain's syndrome.

The risk factors are as follows:

- Individuals 30–50 years of age
- Female:male = 10:1
- Pregnancy
- Repeated use of thumbs as leverage when lifting children or other equipment
- Activities involving repetitive hand and wrist motions

- Direct injury to the wrist or tendons, forming scar tissue
- Inflammatory arthritis (e.g., rheumatoid arthritis)

The etiology is often related to recurring activities which involve maintaining the thumb in a position of extension and abduction. Such activities include gardening, golf, racket sports, or lifting a child [1]. Postpartum females are thought to be particularly at risk, with the peak incidence occurring at approximately 1 month after delivery. Changes in hormone levels and related fluid retention have also been implicated in this population [2–4]. However, there is no widely accepted data to validate this primarily observational hypothesis.

Diagnosis

The diagnosis of De Quervain's tenosynovitis is based on a history of atraumatic radial wrist pain which may spread to the thumb or distal forearm. Physical examination findings commonly involve tenderness localized to the radial styloid and further exacerbated by thumb and wrist motion [1, 5, 6].

Symptoms of De Quervain's tenosynovitis include:

- Pain near the base of the thumb
- Swelling near the base of the thumb
- Sensation of crepitus at the radial wrist
- Difficulty moving the thumb and wrist with actions involving grasping or pinching
- A "sticking" sensation in the thumb with motion

Physical Examination

- Tenderness at the radial styloid near the first dorsal compartment. Often there will be a palpable hypertrophy of the fibrous sheath [1, 6].

L.I. Dinescu, MD (✉) • M. Aalai, MD • X. Wang, MD
Kingsbrook Jewish Medical Center, Department of Rehabilitation,
Interventional Pain Management, Brooklyn, NY, USA
e-mail: ldinescu@kingsbrook.org; maalai@kingsbrook.org;
xwang@kingsbrook.org

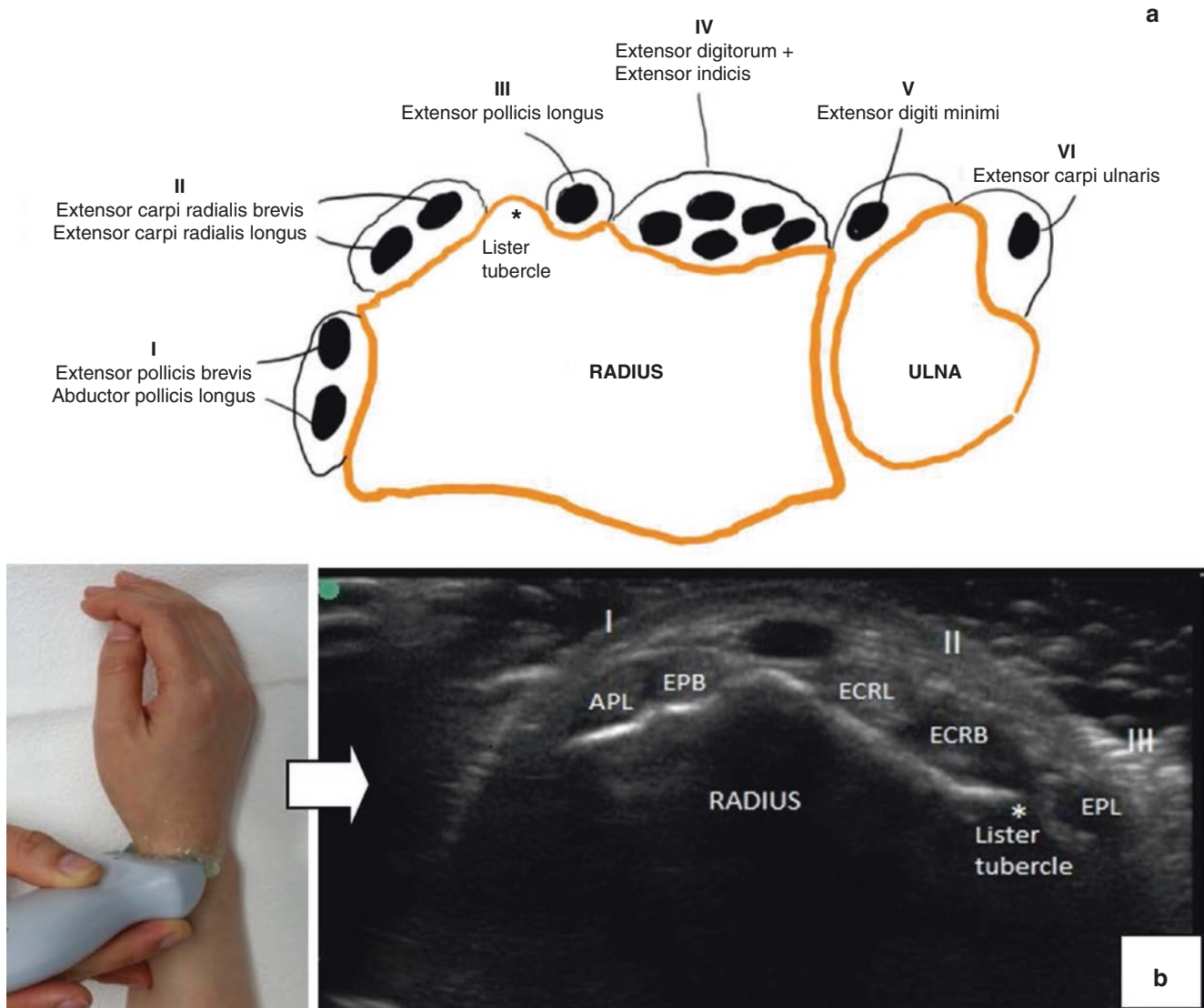


Fig. 25.1 (a) Diagram of the dorsal compartments of the wrist. (b) Ultrasound image of the dorsal compartments. *APL* abductor pollicis longus, *EPB* extensor pollicis brevis, *ECRL* extensor carpi radialis longus, *ECRB* extensor carpi radialis brevis, *EPL* extensor pollicis longus, *I, II, III, IV, V, VI*, the six dorsal compartments



Fig. 25.2 Finkelstein's test

- Pain at the radial styloid with active or passive stretch of the *APL* and *EPB* tendons [1, 5, 6], known as Finkelstein's test (Fig. 25.2). This involves maintaining the patient's elbow in extension, placing the forearm in neutral rotation and the

wrist in radial deviation. The patient is asked to make a fist enclosing the thumb beneath the fingers, and subsequently the examiner places the wrist in ulnar deviation.

Differential Diagnoses

- Carpometacarpal (CMC) arthritis of the thumb—osteoarthritis of the trapezio-metacarpal joint. This induces pain and tenderness at the base of the thumb. The grind maneuver typically will differentiate this condition, with a positive result indicating CMC arthritis.
- Scaphoid fracture—tenderness in the anatomic snuff box.
- Chauffeur's fracture—fracture of the radial styloid.
- Intersection syndrome—acute tendinopathy that occurs more dorsally and proximally, around the area where the *APL* and *EPB* cross over the extensor carpi radialis longus

(ECRL) and brevis (ECRB) in the distal forearm. In addition to swelling and tenderness in this area, there is often crepitus with wrist motion.

- Ganglia—cystic swellings arising from a joint capsule or tendon sheath which can be associated with wrist pain during weight bearing in extension but are often painless and rarely tender to palpation.
- Radial nerve entrapment—rarely, the superficial radial nerve in the forearm may be entrapped between the tendons of the brachioradialis and the extensor carpi radialis or at the wrist, classically due to compression by hand-cuffs [7]. This manifests as burning pain and paresthesias of the dorsal wrist, thumb, index, and middle fingers [8].
- Crystal-induced arthritis—calcium hydroxyapatite and other crystal-induced arthropathies such as gout and pseudogout can cause acute wrist pain and swelling. Significant tenderness, erythema, and swelling are more commonly observed with crystal-induced arthropathies than with De Quervain's tendinopathy.

Imaging

Routine radiographs are typically negative; however, they do have utility in excluding other pathologies. This may include fracture, CMC arthritis, and infections such as osteomyelitis. Other nonspecific findings include:

- Soft tissue edema at the radial styloid
- Focal abnormalities of the distal radius such as cortical erosion, sclerotic changes, or periosteal reaction

Ultrasound can be diagnostic and can also assist with injection of corticosteroid into the tendon compartment. Findings include:

- Increased fluid within the first dorsal compartment
- Edematous thickening of the APL and EPB tendons at the radial styloid on side-to-side comparison
- Thickening of overlying retinaculum and synovium
- Peritendinous edema inducing a hypoechoic region known as “halo sign”
- Hyperemia in the region of the tendon on Doppler
- A possible presence of an intertendinous septum

MRI is a useful tool for detecting mild disease when ultrasound studies are equivocal; however, it is not cost-effective for initial diagnosis.

Treatment

De Quervain's tenosynovitis is a painful condition that is typically self-limited in the majority of patients [7]. The primary focus of treatment is relieving symptoms and limiting

disability. Conservative approaches include rest, modalities, analgesics, and a thumb spica splint. When these interventions fail, corticosteroid injections are a useful tool. Surgery is offered to patients with persistent symptoms despite conservative treatment and after having tried at least one or two local glucocorticoid injections.

Nonsurgical Treatment

- Initial conservative measures include a forearm-based thumb spica splint which leaves the interphalangeal joint-free for functional ROM. The splint is designed to maintain the wrist in extension about 15–20° and places the thumb in 30° of radial and palmar abduction. The splint should be worn throughout the day and at night for the first 2 weeks; however, it may be utilized for a longer period of time depending on the response. Daytime use can be ceased if pain permits and daily activities are gradually tolerated.
- Avoid activities that exacerbate pain and swelling such as thumb flexion, pinch, or other repetitive thumb motions, allowing the tendons of the first dorsal compartment to rest.
- Short-term nonsteroidal anti-inflammatory medication (NSAIDs) should be taken for a maximum duration of 2–4 weeks, unless contraindicated by gastrointestinal, renal, or heart disease. This may help reduce edema and relieve pain.
- Occupational therapy provides patient education for activity modification and strategies for symptom reduction. In addition, hand and wrist exercises may improve strength and range of motion after prolonged immobility. Edema can be controlled using Coban wrapping in a distal to proximal manner, as well as massage with lotion or ice over the distal radius and phonophoresis with 10% hydrocortisone. Movement of the thumb and wrist both actively and passively should be encouraged as often as 15–20 times per hour. This will help to prevent contractures and tendinous adhesions.
- Glucocorticoid injection (Fig. 25.3) into the tendon sheath may be given after 2–6 weeks of conservative therapy or earlier depending on the severity of symptoms. This may help reduce edema and pain. Intermediate-acting glucocorticoids such as methylprednisolone or triamcinolone mixed with a local anesthetic such as lidocaine are used for injection. The injectate should optimally be visualized under ultrasound guidance, distending the APL and EPB tendon sheaths. First dorsal compartment peritendinous corticosteroid injection reduces symptoms in 62–100% cases [1].

Surgical Treatment

- Surgery involves opening (cutting, releasing) of the first dorsal extensor compartment and can be done as a

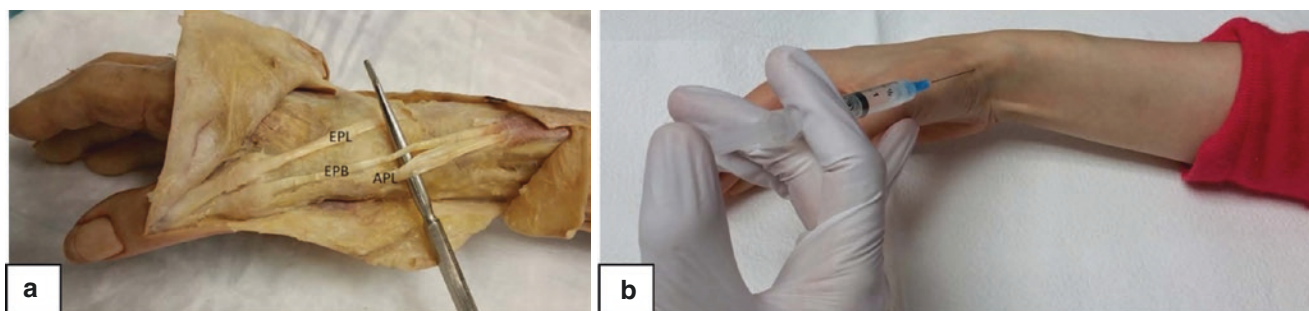


Fig. 25.3 (a) APL and EPB tendons on cadaver. (b) Injection to the first dorsal compartment in between the APL and EPB tendons

simple outpatient surgical procedure using local or regional anesthesia [9, 10]. Immediate thumb and hand mobilization is encouraged and should be increased as tolerated [6].

When to Refer

- Pain nonresponsive to conservative management including rest, medications, and splinting
- Persistent pain despite having tried two corticosteroid injections

Referral

- Physiatry
- Occupational therapy
- Pain management
- Orthopedics

References

1. Braddom RL, editor. Physical medicine & rehabilitation. 4th ed. Philadelphia: Elsevier Saunders; 2011. p. 832.
2. Sheon RP, Moskowitz RW, Goldberg VM. Soft tissue rheumatic pain: recognition, management, prevention. 3rd ed. Baltimore: Williams & Wilkins; 1996.
3. de Quervain F. Uber eine Form von chronischer Tendovaginitis. *Correspondenz-Blatt Schweiz Arzte*. 1895;25:389.
4. Minamikawa Y, Peimer CA, Cox WL, Sherwin FS. De Quervain's syndrome: surgical and anatomical studies of the fibroosseous canal. *Orthopedics*. 1991;14:545.
5. Brotsman SB, Wilk KE. Clinical orthopaedic rehabilitation. 2nd ed. Philadelphia: Mosby Elsevier; 2006. p. 72–3.
6. Canale ST, editor. Campbell's operative orthopaedics. 10th ed. Philadelphia: Mosby Elsevier; 2002. p. 3773–4.
7. Bouche P. Compression and entrapment neuropathies. *Handb Clin Neurol*. 2013;115:311.
8. Lane LB, Boretz RS, Stuchin SA. Treatment of de Quervain's disease: role of conservative management. *J Hand Surg Br*. 2001;26:258.
9. Mellor SJ, Ferris BD. Complications of a simple procedure: de Quervain's disease revisited. *Int J Clin Pract*. 2000;54:76.
10. Ta KT, Eidelman D, Thomson JG. Patient satisfaction and outcomes of surgery for de Quervain's tenosynovitis. *J Hand Surg Am*. 1999;24:1071.