BMJ Best Practice

Tenosynovitis of the hand and wrist

The right clinical information, right where it's needed

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Summary

- Group of painful conditions affecting the tendons of the wrist and hand.
- Caused by relative narrowing of the tendon's retinacular sheath: stenosing tenosynovitis.
- May involve any of the 21 extrinsic (9 flexor and 12 extensor) tendons of the hand and wrist.
- Trigger digits and de Quervain's disease are the 2 most common forms of tenosynovitis tendinopathy.
- Diagnosis is usually clinical.
- If required, the single most useful and accurate investigation is a high-resolution ultrasound scan.
- Treatment may involve non-steroidal anti-inflammatory drugs (NSAIDs), splinting, corticosteroid/local anaesthetic injections, or surgery.

Definition

Tenosynovitis of the hand and wrist is a group of entities with a common pathology involving the extrinsic tendons of the hand and wrist and their corresponding retinacular sheaths. They usually start as tendon irritation manifesting as pain, and can progress into catching and locking when tendon gliding fails.[1] [Fig-1] [Fig-2] [Fig-3] [Fig-4]

Epidemiology

Tendinopathy is one of the most common reasons for a visit to a hand clinic. It is more common in women, with a peak incidence at about the sixth decade of life.[3] [5] [6] [7] [8] [9] [10] [11] [2] [12] [13] Incidence is probably not related to repetitive tasks such as keyboard use.[3] [6] [7] [8] The most common presentation is trigger finger, followed by de Quervain's disease (thumb extensor tendon tendonitis in the first dorsal compartment). Pregnant and postnatal women have increased incidence of de Quervain's disease at a younger age.[14] [15]

Aetiology

The basic aetiology is a stenosing tenosynovitis as the tendon passes through its retinacular sheath.[1] [3] [5] [2] [16] The retinacular sheath is a fibro-osseous canal that functions as a pulley system to reorientate the vector of pull of the tendon towards the hand and digits. Repetitive shear stress through the canal causes irritation to the tendon and its synovial lining (tenosynovium) with inflammation and hypertrophy, along with fibrosis of the retinacular sheath. Over time, the canal will narrow to a point that precludes smooth gliding of the tendon.[17] [18]

Pathophysiology

The most remarkable pathological findings are found on the retinacular sheath surface.[19] They consist of degenerative changes and fibrocartilaginous metaplasia.[10] [16] Inflammatory cells and synovial hypertrophy are rarely present. In response to canal narrowing, the tendon fibres 'bunch up' proximal to the stenosed edge, forming what would be felt as a node that catches upon passing through the pulley or sheath, or locks the tendon in flexion when gliding is no longer possible.[15] [20]

Classification

Stenosing tendinopathies[2]

- Trigger finger: digital flexor tendon tendonitis at the A1 pulley leading to catching and locking.
- de Quervain's disease: tendonitis of the abductor pollicis longus and extensor pollicis brevis tendons as they pass through the first dorsal compartment of the wrist at the radial styloid process.
- Intersection syndrome: tendonitis of the second dorsal compartment tendons as they pass under the first dorsal compartment tendons.
- Extensor pollicis longus tenosynovitis.
- Extensor carpi ulnaris tenosynovitis.

- Flexor carpi radialis tenosynovitis.

Trigger digit classification[3]

- Grade I (pre-trigger): pain; history of catching; normal motion on examination; tenderness over the A1 pulley.
- Grade II (active): catching present on examination, full extension possible actively.
- Grade III (passive): locked digit in flexion (grade IIIA) or extension (grade IIIB); full motion achieved passively with assistance.
- Grade IV (contracture): fixed flexion contracture of the proximal interphalangeal joint.

Only trigger digit has a formal classification.

Trigger finger classification[4]

- Grade 0: mild crepitus in the non-triggering finger.
- Grade 1: no triggering, but uneven finger movements.
- Grade 2: triggering is actively correctable.
- Grade 3: usually correctable by the other hand.
- Grade 4: the digit is locked.

Primary prevention

No primary preventive measures are available.

Secondary prevention

Patients with stenosing tendinopathy should be instructed to avoid predisposing positions and/or functions that exacerbated the initial presentation.

Case history

Case history #1

A 55-year-old female secretary reports pain and catching of her left dominant thumb. This started over the previous few months and she is a known diabetic. No other digits are involved. She denies any locking of her thumb, and can actively flex and extend her thumb, although sometimes with difficulty. On examination a tender, palpable nodule could be felt over her left thumb metacarpophalangeal joint. When asked to flex and extend her thumb she could easily flex, but her thumb caught on the way to full extension.

Case history #2

A 60-year-old male labourer presents with right wrist pain. The pain is located over the dorsal radial side of his wrist. It is exacerbated while at work and improves with rest. He has no limitation of motion, but ulnar deviation is very painful. He has local tenderness in the area of the radial styloid.

Other presentations

Stenosing tendinopathy can involve any extrinsic tendon of the hand or wrist. It usually presents with pain and swelling in the area where the tendon passes through its retinacular sheath. Early on the tendon shows full active motion. Later the tendon progresses into catching and ultimately locking, such as in trigger finger.

Step-by-step diagnostic approach

The basic common features of all stenosing tendinopathies are pain, swelling, and tenderness at the point where an extrinsic tendon enters its retinacular sheath. Symptoms increase with active motion and more so with resisted motion. Lack of motion associated with increased pain may signify locking. Diagnosis can be confirmed by injection of local anaesthetic (lidocaine) into the corresponding sheath, resulting in resolution of symptoms.[1] [2]

Trigger finger

Digital flexor tendon tendonitis at the A1 pulley in the hand (trigger finger) typically presents with painful catching or popping of the flexor tendon, which occurs as the patient flexes and extends the digit. The digit may be locked in flexion. Passive manipulation into extension may release the locking. Prolonged neglect will result in flexion contracture of the finger. A tender nodule may be palpable at the level of the metacarpal head in the palm. True joint locking (rare), extensor tendon subluxation, and locking under the A2 pulley in the finger (rare) should be ruled out using physical examination, MRI, or CT scan.[3] [6] [7] [8] [10] [11] [12]

de Quervain's disease

Defined as tenosynovitis of the abductor pollicis longus and extensor pollicis brevis tendons as they pass through the first dorsal compartment of the wrist at the radial styloid process. de Quervain's disease presents with pain, tenderness, and swelling localised to the radial side of the wrist 1 to 2 cm proximal to the radial styloid. It is aggravated by thumb movement. Pain is exacerbated by ulnar deviation of the wrist when the thumb is clasped in the palm (Finkelstein test). Basilar thumb arthritis (presenting with direct tenderness over the joint; positive grind test) and radial sensory nerve neuritis (Wartenberg's syndrome presenting with direct tenderness, sensory changes, and positive Tinel's sign over the radial sensory nerve) should be ruled out.[5] [9] [2] [14] [17] [22]

Intersection syndrome

Tenosynovitis of the second dorsal compartment tendons (extensor carpi radialis longus/extensor carpi radialis brevis) results in intersection syndrome. It is thought to be the result of friction between the muscle bellies of the abductor pollicis longus and the extensor pollicis brevis (first compartment) and the radial wrist extensor tendons (second compartment). It presents as pain and swelling 4 cm proximal to the wrist joint. In severe cases, redness and palpable, and sometimes audible, crepitus are noted on examination. Pain is greatly increased by resisted wrist extension.[29]

Extensor pollicis longus tenosynovitis

This is rare but requires early diagnosis and treatment to prevent rupture. Pain, swelling, and tenderness at Lister's tubercle are presenting features. Thumb interphalangeal joint motion causes pain at Lister tubercle.[27] [30] [31]

Extensor carpi ulnaris tenosynovitis

This common condition is one of the causes of ulnar-sided wrist pain. Pain is increased with all motions of the wrist. Pain with extension/ulnar deviation against resistance is suggestive. Extensor carpi ulnaris subluxation can also present with reactive synovitis. It is important to distinguish between tenosynovitis and instability because surgical management differs. Triangular fibrocartilage complex tear or dorsal sensory branch of ulnar nerve irritation should be ruled out using MRI or CT scan.[32] [33]

Flexor carpi radialis tenosynovitis

It presents with pain at the palmar wrist crease over the scaphoid tubercle and along the length of the tendon. Increased pain with resisted wrist flexion and radial deviation is pathognomonic. Localised swelling and a ganglion cyst may be present.[28]

Role of imaging

Diagnosis of the vast majority of cases of tendonitis and tenosynovitis pathologies is clinical. The single most useful and accurate diagnostic investigation for all the stenosing tendinopathies is a high-resolution ultrasound scan. Ultrasonography can be used to diagnose both sterile and purulent tenosynovitis, as well as a number of other hand and wrist pathologies. Improvements in high-resolution ultrasound are producing increasingly high-quality images of superficial structures, expanding the indications for this imaging modality in the hand and wrist.[34] [35] [36]

Other modalities may be useful to rule out other diagnoses if highly suspected, but are not used routinely:

- Plain x-rays are helpful to evaluate for occult wrist fractures, wrist arthritis (basilar thumb and radiocarpal arthritis), and calcific tendonitis, among others.
- Advanced imaging, such as CT and MRI, is helpful if clinical suspicion persists and plain x-rays prove unhelpful (e.g., to rule out occult scaphoid fracture, subretinacular ganglion cysts, tendon degeneration, reactive synovitis).

Blood studies

Blood studies (FBC, ESR, CRP) do not have a direct role in the diagnosis of stenosing tendinopathies. They help to establish or rule out other diagnoses, such as rheumatoid arthritis, gout, and infection (septic tenosynovitis, cellulitis, septic arthritis).

Risk factors

Strong

age between fifth and sixth decades

- Possible relationship to degenerative changes.[10] [11] [2] [12] [13]

female sex

- Stenosing tendonopathies are far more common in women than in men.[3] [5] [6] [7] [18] [15]

hx of current concomitant conditions with similar pathology (stenosing tendinopathy or neuropathy)

- The same basic pathophysiology can present at the same or at different times in different locations with stenosing tendinopathy or neuropathy.[7] [9] [2] [12] [21] [22]

involvement of dominant hand

- Possible relationship to degenerative changes.[3] [7] [2] [16]

insulin-dependent diabetes

- For reasons that are not fully understood, the risk may be up to 5 times higher in insulin-dependent diabetics than in non-diabetics.[23]

pregnancy and lactation

- Risk factor for de Quervain's syndrome. Thought to be related to fluid shifts and increased demands with newborn care.[14]

Weak

degenerative joint disease or trauma

- Especially in extensor pollicis longus tenosynovitis (related to blunt trauma or non-displaced distal radius fracture) and flexor carpi radialis tendovaginitis (related to basilar thumb arthritis).[24] [25] [26] [27] [28]

History & examination factors

Key diagnostic factors

presence of risk factors (common)

- Key risk factors are age between fifth and sixth decades, female sex, hx of current concomitant conditions with similar pathology (stenosing tendinopathy or neuropathy), involvement of dominant hand, insulin-dependent diabetes, pregnancy, and lactation.[3] [6] [7] [9] [2] [12] [18] [21] [23] [37] [38]

location over and around a retinacular sheath (common)

- Locations of symptoms and signs of pain not directly over a retinacular sheath should direct attention to alternative diagnoses.[1] [2]

pain increased with motion (common)

- Pain may be present without motion, but it should increase with active and passive motion. Motion is frequently restricted because of pain and/or locking.[1] [2]

response to anaesthetic injection (common)

- Appropriately placed anaesthetic injection should dramatically improve symptoms. If not, other diagnoses should be considered, including another stenosing tendinopathy in the area (de Quervain's versus intersection syndrome/flexor carpi radialis tenosynovitis/trigger thumb/basilar thumb arthritis; extensor carpi ulnaris tenosynovitis versus triangular fibrocartilage complex).[1] [2]

painful popping sensation with finger flexion and extension (trigger finger) (common)

- Trigger finger presents with painful catching or popping of the flexor tendon, which occurs as the patient flexes and extends the digit. The digit may be locked in flexion. Passive manipulation into extension may release the locking. Prolonged neglect will result in flexion contracture of the finger.[3] [6] [7] [8] [10] [11] [12]

palpable nodule at the level of the metacarpal head (trigger finger) (common)

- A tender nodule may be palpable at the level of the metacarpal head in the palm.[3] [6] [7] [8] [10] [11] [12]

pain, tenderness, and swelling localised to radial side of wrist (de Quervain's disease) (common)

- de Quervain's disease presents with pain, tenderness, and swelling localised to the radial side of the wrist 1 to 2 cm proximal to the radial styloid. It is aggravated by thumb movement. Pain is exacerbated by ulnar deviation of the wrist when the thumb is clasped in the palm (Finkelstein test).[5] [9] [2] [14] [17] [22]

pain and swelling proximal to wrist joint (intersection syndrome) (common)

- Intersection syndrome presents as pain and swelling 4 cm proximal to the wrist joint. In severe cases, redness and palpable, and sometimes audible, crepitus are noted on examination. Pain is greatly increased by resisted wrist extension.[29]

pain, swelling, tenderness at Lister's tubercle (extensor pollicis longus tenosynovitis) (common)

- Presenting features of extensor pollicis longus entrapment. Thumb interphalangeal joint motion causes pain at Lister's tubercle.[26] [27]

ulnar-sided wrist pain (extensor carpi ulnaris tenosynovitis) (common)

- Ulnar-sided wrist pain, increased with all motions of the wrist, is suggestive of extensor carpi ulnaris tenosynovitis. Pain with extension/ulnar deviation against resistance is suggestive.[32] [33]

pain at palmar wrist crease over scaphoid tubercle and along length of tendon (flexor carpi radialis tenosynovitis) (common)

- Suggestive of flexor carpi radialis tenosynovitis. Increased pain with resisted wrist flexion and radial deviation is pathognomonic. Localised swelling and a ganglion cyst may be present.[28]

Other diagnostic factors

symptom duration over weeks to months (common)

- Symptoms develop over weeks to months. Acute presentation should direct attention to other possible diagnoses.[1] [2]

Diagnostic tests

1st test to order

Test	Result
high-resolution ultrasound scan • Ultrasonography can be used to diagnose both sterile and purulent tenosynovitis, as well as a number of other hand and wrist pathologies. Improvements in high-resolution ultrasound are producing increasingly high-quality images of superficial structures, expanding the indications for this imaging modality in the hand and wrist.[34] [35] [36]	**effusion, tendon sheath thickening, hyperaemia**

Other tests to consider

Test	Result
plain x-ray of affected hand and wrist • Not indicated in most cases. Used to rule out other pathologies when suspected, such as fractures or dislocations, arthritis, calcific tendonitis, soft tissue masses.	**normal**
FBC • Not indicated in most cases. Used to rule out septic or inflammatory conditions when suspected.	**normal**
ESR • Not indicated in most cases. Used to rule out septic or inflammatory conditions when suspected.	**normal**
CRP • Not indicated in most cases. Used to rule out septic or inflammatory conditions when suspected.	**normal**
MRI • Not indicated in the vast majority of cases. Used to rule out other pathologies when suspected, such as occult masses or cysts, tendon rupture, triangular fibrocartilage complex tear, or ligament injury if suspected. May be used to rule out true joint locking, extensor tendon subluxation, and locking under the A2 pulley from trigger finger.[39] [40]	**normal**
CT scan • Not indicated in the vast majority of cases. Used to rule out other pathologies when suspected, such as occult masses or cysts, tendon rupture, triangular fibrocartilage complex tear, or ligament injury if suspected. May be used to rule out true joint locking, extensor tendon subluxation, and locking under the A2 pulley from trigger finger.	**normal**

Differential diagnosis

Condition	Differentiating signs / symptoms	Differentiating tests
Osteoarthritis (for de Quervain's, flexor carpi radialis tenosynovitis)	• Direct tenderness over corresponding joint. No tenderness over the suspected tendon.	• Plain x-rays of affected hand, wrist, and thumb base: arthritic changes including sclerosis, joint space narrowing, osteophytes, and/or cystic changes.
Occult fracture (e.g., scaphoid)	• Direct tenderness over corresponding joint. No tenderness over the suspected tendon.	• Plain x-ray of affected hand and wrist: occult fracture lines. • CT scan and/or MRI if plain x-ray is negative: occult fracture lines.
Cellulitis	• Open wound may be present; acute development of signs. Macular erythema with indistinct borders, warmth, tenderness, and oedema. • Diagnosis is clinical in most cases.	• ESR: elevated. • CRP: elevated. • Fluid Gram stain/culture: may be positive for causative bacteria.
Septic tenosynovitis	• Signs of infection, such as erythema, fusiform swelling, and fluctuance, may be present locally.	• FBC with differential: elevated WBC. • ESR: elevated. • CRP: elevated. • Fluid cell count: elevated. • Fluid Gram stain/culture: may be positive for causative bacteria.
Septic arthritis	• Open wound; acute development of signs.	• FBC with differential: elevated WBC. • ESR: elevated. • CRP: elevated. • Fluid cell count: elevated. • Fluid Gram stain/culture: may be positive for causative bacteria. • MRI: will show a fluid collection or effusion in the joint with possible corresponding bone changes, if chronic.[41]
Rheumatoid arthritis	• Systemic signs and symptoms; other joint involvement; history of bilateral, symmetric pain and swelling of the small joints of the hands and feet that has lasted for >6 weeks; morning stiffness; rheumatoid nodules over the extensor surfaces of tendons, or vasculitic skin involvement.	• ESR: elevated. • CRP: elevated. • Fluid cell count: elevated. • Rheumatoid factor: positive in 70%.
Gout	• Swelling, effusion, warmth, erythema, and/or tenderness of the involved joint(s).	• Plain x-ray: degenerative changes. • Uric acid: elevated.

Condition	Differentiating signs / symptoms	Differentiating tests
Dupuytren's contracture	• Painless nodules in palm and digits; insidious development over months or years. Mild cases easily confused with locked trigger digit.	• No specific test; clinically palpable cord in palm.

Step-by-step treatment approach

Most primary stenosing tendinopathies in adults can be successfully treated non-surgically. Oral non-steroidal anti-inflammatory drugs (NSAIDs) and splinting can be attempted for a period of 4 to 6 weeks initially. Corticosteroid injection may be offered initially in place of or in addition to NSAIDs and splinting. Alternatively, it may be used after NSAIDs and splinting have been tried.

Opinion varies as to the choice of corticosteroid compound and its preparation. Methylprednisolone, triamcinolone, and betamethasone are among the most commonly used.[6] [7] [8] [23] [37] [42] [43] [44] [45] The corticosteroid compound is mixed with a local anaesthetic, most commonly 1% lidocaine. Some treating physicians add sodium bicarbonate in a 1:10 mixture. Total volume injected is about 1 to 3 mL depending on the site and preference. A small needle is preferred (e.g., 25- or 27-gauge). The injection may be repeated on several occasions.[7] [45] Injection of hyaluronic acid as an alternative treatment for trigger digits has been studied and has shown equivalent outcomes when compared with corticosteroid injections in a randomised trial.[46]

Surgery is reserved for patients who fail or refuse conservative management. Patients may refuse injection therapy if they believe that the discomfort of the injection itself would be greater than the described symptoms. A correctly administered corticosteroid injection (with or without imaging guidance) should cause no more than mild discomfort. Patients may also refuse injection therapy if they have had a previously unsuccessful steroid injection at this site or elsewhere in the past. Surgery consists of incising the stenosed sheath. Synovectomy is performed when needed. NSAIDs and ice application may be useful adjuncts in some conditions.

Trigger finger

Treatment starts with a trial of flexor tendon sheath corticosteroid injection. Several techniques exist, but all involve injecting the mixture into the flexor tendon sheath. In case surgery is deemed necessary, such as when injection fails or the digit cannot be unlocked, open or percutaneous techniques can be used to incise the A1 pulley, allowing the flexor tendons to glide freely.[47] [48] [49] [50] [51] [52] [53] [54] [55] In the presence of rheumatoid arthritis, synovectomy rather than pulley release is preferred to avoid bow-stringing and further ulnar deviation of the digits.

de Quervain's disease

Treatment commonly starts with splinting and NSAIDs for a period of 4 to 6 weeks. A trial of first dorsal compartment injection can be performed next.[5] [2] [22] [44] [56] [57] Corticosteroid injection combined with splinting has also been described.[58] [59] Thumb and wrist immobilisation is used for comfort and resting.[9] [22] In case surgery is deemed necessary, such as when injection fails, the first dorsal compartment is incised longitudinally, allowing the extensor tendons to glide freely. It is imperative to positively identify the extensor pollicis brevis (EPB) because it might be in a separate subsheath, separate from the abductor pollicis longus, which is frequently formed of multiple slips.[17] [22] Failure to recognise and release an EPB subcompartment can be a cause of treatment failure or recurrence.[60] [61] [62] Endoscopic release of the first dorsal compartment has also been described.[63] In pregnancy and lactation, non-operative treatment is highly effective, and the condition tends to resolve after cessation of lactation.[14] [64] [65]

Extensor pollicis longus tenosynovitis

Urgent surgical exploration, third dorsal compartment release, and tendon transposition are crucial to avoid attritional rupture of the tendon. NSAIDs and splinting can be offered for pain relief for a period of 4 to 6 weeks.

Extensor carpi ulnaris tendon tenosynovitis

Conservative management with splinting, immobilisation, and injection is attempted initially.[32] [33] [38] [66] [67] If this is unsuccessful, surgical treatment consists of release of the sixth dorsal compartment. Further surgical procedures performed as deemed necessary intraoperatively may include tenosynovectomy and retinacular sheath repair and/or reconstruction.

All other tenosynovitides

Conservative management with a trial of NSAIDs and splinting for a period of 4 to 6 weeks can be attempted initially. A trial of corticosteroid injection is also frequently attempted early on. An injection is often offered as a first-line treatment and is considered co-equal to NSAIDs by many. This applies to all categories that do not require urgent intervention. Following the trial injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred to surgery. If these are unsuccessful, surgery can be attempted, consisting of surgical release of the corresponding compartment.[29]

Treatment details overview

Consult your local pharmaceutical database for comprehensive drug information including contraindications, drug interactions, and alternative dosing. (see Disclaimer)

Acute (summary)

Patient group	Tx line	Treatment
trigger finger	**1st**	**NSAIDs**
	1st	**flexor tendon sheath injection**
	2nd	**surgery**
de Quervain's disease	**1st**	**NSAIDs + splinting**
	2nd	**first dorsal compartment injection +/- splinting**
	3rd	**surgery**
extensor pollicis longus tenosynovitis	**1st**	**surgery**
	adjunct	**NSAIDs + splinting**
extensor carpi ulnaris tendon tenosynovitis	**1st**	**NSAIDs + splinting**
	1st	**extensor carpi ulnaris sheath injection**
	2nd	**surgery**
all other tenosynovitides	**1st**	**NSAIDs + splinting**
	1st	**sheath/compartment injection**
	2nd	**surgery**

Treatment options

Acute

Patient group	Tx line	Treatment
trigger finger	**1st**	**NSAIDs** » No formal physical or occupational therapy programme is necessary or recommended. » A trial of oral non-steroidal anti-inflammatory drugs (NSAIDs) can be attempted for a period of 4 to 6 weeks initially, but frequently a trial of flexor tendon sheath corticosteroid injection is offered early on. » NSAIDs and tendon sheath injections do not effectively treat locked cases (grades III and IV); direct referral for surgery is recommended in these cases. **Primary options** » diclofenac potassium: 50 mg orally (immediate-release) three times daily when required **OR** » ibuprofen: 300-400 mg orally every 6-8 hours when required, maximum 2400 mg/day **OR** » naproxen: 500 mg orally twice daily when required, maximum 1250 mg/day **OR** » meloxicam: 15 mg orally once daily **OR** » celecoxib: 200 mg orally once daily
	1st	**flexor tendon sheath injection** » Frequently, a trial of flexor tendon sheath corticosteroid injection is offered early on or as a first-line treatment and is considered co-equal to non-steroidal anti-inflammatory drugs (NSAIDs) by many. This applies to all categories. However, NSAIDs and tendon sheath injections do not effectively treat locked cases (grades III and IV); direct referral for surgery is recommended in these cases. » Several techniques exist, but all involve injecting the mixture into the flexor tendon sheath. » Following a trial of corticosteroid injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred to surgery.

Acute

Patient group	Tx line	Treatment
		» Opinion varies as to the choice of corticosteroid compound and its preparation. Methylprednisolone, triamcinolone, and betamethasone are among the most commonly used.[6] [7] [8] [23] [37] [42] [43] [44] [45]
		» The corticosteroid compound is mixed with a local anaesthetic, most commonly 1% lidocaine. Some treating physicians add sodium bicarbonate in a 1:10 mixture.
		» Total volume injected is about 1 to 3 mL depending on the site and preference. A small needle is preferred (e.g., 25- or 27-gauge). The injection may be repeated on several occasions.[7] [45]
		Primary options
		» methylprednisolone acetate: 20 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » triamcinolone acetonide: 5 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » betamethasone sodium phosphate/betamethasone acetate: 6 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **--AND--** » lidocaine: (1%) 1 mL injected into flexor tendon sheath as a single dose with corticosteroid
	2nd	**surgery**
		» In case surgery is deemed necessary, such as when injection fails or the digit cannot be unlocked, open or percutaneous techniques can be used to incise the A1 pulley, allowing the flexor tendons to glide freely.[47] [48] [49] [50] [51] [52] [53] [54] In the presence of rheumatoid arthritis, synovectomy rather than pulley release is preferred to avoid bow-stringing and further ulnar deviation of the digits.
de Quervain's disease	**1st**	**NSAIDs + splinting**
		» Treatment commonly starts with splinting and oral NSAIDs for a period of 4 to 6 weeks.
		» Thumb and wrist immobilisation is used for comfort and resting.[9] [22]

Acute

Patient group	Tx line	Treatment
		» NSAIDs are generally contraindicated in pregnancy. In pregnancy and lactation, non-operative treatment is highly effective; the condition tends to resolve after cessation of lactation. Splinting is sufficient in most cases.[14] [64] [65]
		Primary options
		» diclofenac potassium: 50 mg orally (immediate-release) three times daily when required
		OR
		» ibuprofen: 300-400 mg orally every 6-8 hours when required, maximum 2400 mg/day
		OR
		» naproxen: 500 mg orally twice daily when required, maximum 1250 mg/day
		OR
		» meloxicam: 15 mg once orally daily
		OR
		» celecoxib: 200 mg orally once daily
	2nd	**first dorsal compartment injection +/- splinting**
		» A trial of first dorsal compartment corticosteroid injection can be performed next.[5] [2] [22] [44] [56] [57] Corticosteroid injection combined with splinting has also been described.[58]
		» Following a trial of corticosteroid injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred to surgery.
		» Opinion varies as to the choice of corticosteroid compound and its preparation. Methylprednisolone, triamcinolone, and betamethasone are among the most commonly used.[6] [7] [8] [23] [37] [42] [43] [44] [45]
		» The corticosteroid compound is mixed with a local anaesthetic, most commonly 1% lidocaine. Some treating physicians add sodium bicarbonate in a 1:10 mixture.
		» Total volume injected is about 1 to 3 mL depending on the site and preference. A small needle is preferred (e.g., 25- or 27-gauge). The injection may be repeated on several occasions.[7] [45] Care must be taken to place the injectate in the extensor sheath and not subcutaneously, as skin thinning and fat atrophy can

Acute

Patient group	Tx line	Treatment
		result from a superficial corticosteroid injection at this site.
		Primary options
		» methylprednisolone acetate: 20 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » triamcinolone acetonide: 5 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » betamethasone sodium phosphate/betamethasone acetate: 6 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **--AND--** » lidocaine: (1%) 1 mL injected into flexor tendon sheath as a single dose with corticosteroid
	3rd	**surgery** » In case surgery is deemed necessary, such as when injection fails, the first dorsal compartment is incised longitudinally, allowing the extensor tendons to glide freely. It is imperative to positively identify the extensor pollicis brevis (EPB) because it might be in a separate subsheath, separate from the abductor pollicis longus, which is frequently formed of multiple slips.[17] [22] Failure to recognise and release an EPB subcompartment can be a cause of treatment failure or recurrence.[60] [61] [62] » Endoscopic release of the first dorsal compartment has also been described.[63]
extensor pollicis longus tenosynovitis	**1st**	**surgery** » Although oral non-steroidal anti-inflammatory drugs (NSAIDs) can be offered for pain, surgical exploration should be planned as soon as possible (within days to weeks) to avoid attritional rupture of the tendon. The third dorsal compartment is released, and the extensor pollicis longus tendon is transposed outside the compartment.
	adjunct	**NSAIDs + splinting** » Oral NSAIDs and splinting can be offered for pain relief for a period of 4 to 6 weeks.
		Primary options

Acute

Patient group	Tx line	Treatment
		» diclofenac potassium: 50 mg orally (immediate-release) three times daily when required **OR** » ibuprofen: 300-400 mg orally every 6-8 hours when required, maximum 2400 mg/day **OR** » naproxen: 500 mg orally twice daily when required, maximum 1250 mg/day **OR** » meloxicam: 15 mg once orally daily **OR** » celecoxib: 200 mg orally once daily
extensor carpi ulnaris tendon tenosynovitis	**1st**	**NSAIDs + splinting** » A trial of oral NSAIDs for a period of 4 to 6 weeks can be attempted initially, together with splinting. A volar-based wrist splint is applied with the wrist immobilised in the neutral position. **Primary options** » diclofenac potassium: 50 mg orally (immediate-release) three times daily when required **OR** » ibuprofen: 300-400 mg orally every 6-8 hours when required, maximum 2400 mg/day **OR** » naproxen: 500 mg orally twice daily when required, maximum 1250 mg/day **OR** » meloxicam: 15 mg once orally daily **OR** » celecoxib: 200 mg orally once daily
	1st	**extensor carpi ulnaris sheath injection** » A trial of corticosteroid injection is frequently attempted early on.[32] [33] [38] [66] [67] An injection is often offered as a first-line treatment and is considered co-equal to NSAIDs by many. This applies to all categories that do not require urgent intervention.

Acute

Patient group	Tx line	Treatment
		» Following the injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred for surgery. » Opinion varies as to the choice of corticosteroid compound and its preparation. Methylprednisolone, triamcinolone, and betamethasone are among the most commonly used.[6] [7] [8] [23] [37] [42] [43] [44] [45] » The corticosteroid compound is mixed with a local anaesthetic, most commonly 1% lidocaine. Some treating physicians add sodium bicarbonate in a 1:10 mixture. » Total volume injected is about 1 to 3 mL depending on the site and preference. A small needle is preferred (e.g., 25- or 27-gauge). The injection may be repeated on several occasions.[7] [45] **Primary options** » methylprednisolone acetate: 20 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » triamcinolone acetonide: 5 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » betamethasone sodium phosphate/betamethasone acetate: 6 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **--AND--** » lidocaine: (1%) 1 mL injected into flexor tendon sheath as a single dose with corticosteroid
	2nd	**surgery** » Surgical treatment consists of release of the sixth dorsal compartment. Further surgical procedures performed as deemed necessary intraoperatively may include tenosynovectomy and retinacular sheath repair and/or reconstruction.
all other tenosynovitides	**1st**	**NSAIDs + splinting** » Conservative management with a trial of oral NSAIDs and splinting for a period of 4 to 6 weeks can be attempted initially.

Acute

Patient group	Tx line	Treatment
		Primary options » diclofenac potassium: 50 mg orally (immediate-release) three times daily when required **OR** » ibuprofen: 300-400 mg orally every 6-8 hours when required, maximum 2400mg/day **OR** » naproxen: 500 mg orally twice daily when required, maximum 1250 mg/day **OR** » meloxicam: 15 mg once orally daily **OR** » celecoxib: 200 mg orally once daily
	1st	**sheath/compartment injection** » A trial of corticosteroid injection is frequently attempted early on. An injection is often offered as a first-line treatment and is considered co-equal to NSAIDs by many. This applies to all categories. » Following the trial injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred to surgery. » Opinion varies as to the choice of corticosteroid compound and its preparation. Methylprednisolone, triamcinolone, and betamethasone are among the most commonly used.[6] [7] [8] [23] [37] [42] [43] [44] [45] » The corticosteroid compound is mixed with a local anaesthetic, most commonly 1% lidocaine. Some treating physicians add sodium bicarbonate in a 1:10 mixture. » Total volume injected is about 1 to 3 mL depending on the site and preference. A small needle is preferred (e.g., 25- or 27-gauge). The injection may be repeated on several occasions.[7] [45] **Primary options** » methylprednisolone acetate: 20 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-**

Acute

Patient group	Tx line	Treatment
		» triamcinolone acetonide: 5 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **-or-** » betamethasone sodium phosphate/betamethasone acetate: 3 mg (1 mL) injected into flexor tendon sheath as a single dose, may repeat **--AND--** » lidocaine: (1%) 1 mL injected into flexor tendon sheath as a single dose with corticosteroid
	2nd	**surgery** » Surgery consists of surgical release of the corresponding compartment.[29]

FOLLOW UP

Recommendations

Monitoring

Following a trial of corticosteroid injection, follow-up is scheduled within 1 month for repeat examination. If the injection fails, a second injection may be given or the patient may be referred to surgery.

Patient instructions

Patients should be advised to maintain their motion even if that requires assistance with the opposite hand. If symptoms recur after a successful injection, patients should be instructed to follow up for re-evaluation.

Complications

Complications	Timeframe	Likelihood
contracture (trigger finger)	**long term**	**high**
Prolonged neglect of a locked digit will result in joint flexion contracture.		
tendon rupture (extensor pollicis longus tenosynovitis, flexor carpi radialis tenosynovitis)	**long term**	**high**
Prolonged neglect of an affected tendon at risk will result in attritional rupture.		
corticosteroid injection-related skin changes	**long term**	**low**
Superficial corticosteroid injection may cause subcutaneous atrophy, fat necrosis, and/or depigmentation in dark skin and red pigmentation in white skin.		
surgery-related injury to sensory nerves (de Quervain's, ECU, trigger finger)	**long term**	**low**
Proximity of sensory nerve to the surgical field makes nerves prone to iatrogenic injury (laceration/traction), leading to numbness and neuroma formation.		
surgery-related tendon bow-stringing or subluxation (trigger finger, ECU)	**long term**	**low**
Releasing retinacular sheaths bypasses their role in stabilising and reorientating the vector of the involved tendon.		
neuritis (de Quervain's, extensor carpi ulnaris [ECU] tenosynovitis)	**variable**	**low**
Prolonged irritation and surrounding inflammation may involve nearby sensory nerves.		

Prognosis

Most patients respond to conservative measures with adjustment of the daily activities that exacerbate the symptoms. In resistant cases, surgical treatment is highly successful.

Trigger finger

Splinting alone can be effective in 55% to 66% of cases.[3] [68] Corticosteroid injections are successful in 48% to 93% of cases.[6] [7] [8] [23] [37] [42] [43] [44] [45] Percutaneous release success has been reported in 58% to 100% of cases.[47] [48] [49] [50] [51] [52] [53] [54] Open trigger digit release remains the definitive treatment.

de Quervain's disease

Splinting alone is not highly effective.[69] One or two corticosteroid injections are successful in 50% to 80% of cases.[5] [2] [22] [44] [57] In one small prospective study, the combination of corticosteroid injection and splinting was more effective than injection alone.[58] In pregnancy and lactation, non-operative treatment is highly effective; the condition tends to resolve after cessation of lactation.[14] [64] [65] For resistant cases, open release is the definitive treatment. Endoscopic release has also been described.[63]

All other tenosynovitides

Most patients respond to conservative measures with adjustment of the daily activities that exacerbate the symptoms. The use of splinting for temporary immobilisation or rest, particularly at night, can be useful. In resistant cases, surgical treatment is highly successful.

Diagnostic guidelines

North America

ACR–SPR–SSR practice parameter for the performance and interpretation of magnetic resonance imaging (MRI) of the fingers and toes

Published by: American College of Radiology **Last published:** 2014

Summary: Practice parameter guidelines for the use of MRI for the detection, evaluation, staging, and follow-up of musculoskeletal conditions of the fingers and toes.

ACR–SCBT-MR–SPR–SSR practice parameter for the performance of magnetic resonance imaging (MRI) of the wrist

Published by: American College of Radiology **Last published:** 2014

Summary: Practice parameter guidelines for the use of MRI for the detection, evaluation, staging, and follow-up of disorders of the wrist.

ACR–SPR–SSR practice parameter for the performance and interpretation of magnetic resonance imaging (MRI) of bone, joint, and soft tissue infections in the extremities

Published by: American College of Radiology **Last published:** 2014

Summary: Practice parameter guidelines for the use of MRI for the evaluation of musculoskeletal infections.

Forearm, wrist, and hand (acute and chronic), not including carpal tunnel syndrome

Published by: Work Loss Data Institute **Last published:** 2013

Summary: Discusses the diagnosis of work-related acute and chronic injuries to the forearm, hand, and wrist, including tenosynovitis.

Occupational medicine practice guidelines

Published by: American College of Occupational and Environmental Medicine **Last published:** 2011

Summary: Discusses the diagnosis of hand, wrist, and forearm disorders, including tenosynovitis.

Treatment guidelines

North America

Forearm, wrist, and hand (acute and chronic), not including carpal tunnel syndrome

Published by: Work Loss Data Institute **Last published:** 2013

Summary: Discusses the treatment of work-related acute and chronic injuries to the forearm, hand, and wrist, including tenosynovitis.

North America

Occupational medicine practice guidelines

Published by: American College of Occupational and Environmental Medicine **Last published:** 2011

Summary: Discusses the treatment of hand, wrist, and forearm disorders, including tenosynovitis.

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Images

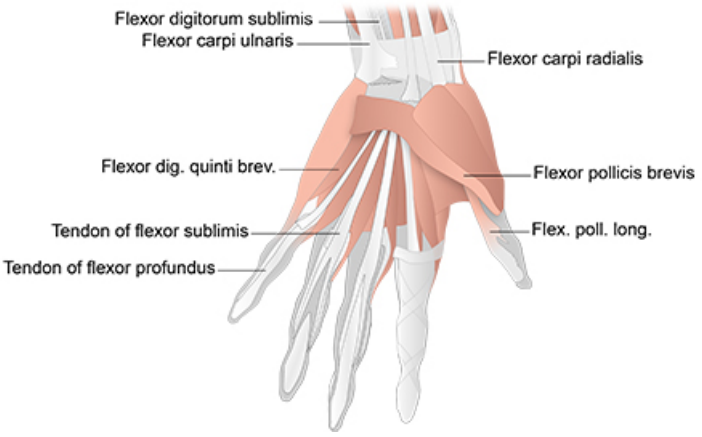

Figure 1: Tendons of the left hand

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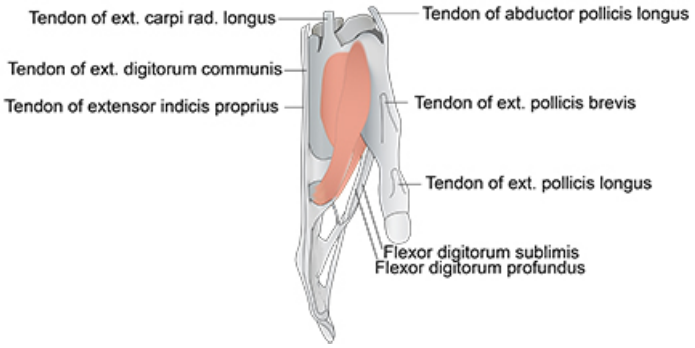

Figure 2: Tendons of the forefinger

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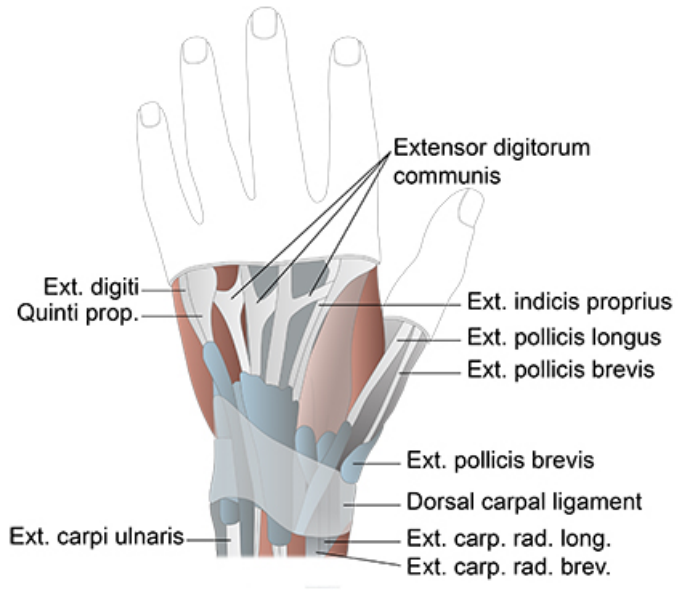

Figure 3: Tendons of the back of the wrist

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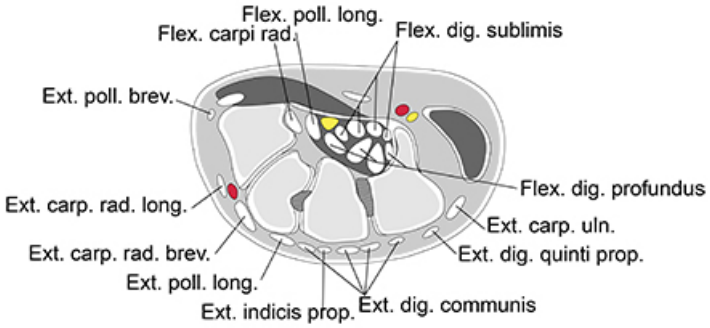

Figure 4: Transverse section across the wrist

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