

De Quervain's Syndrome

Indexing Metadata/Description

- › **Title/condition:** De Quervain's Syndrome
- › **Synonyms:** De Quervain's tenosynovitis; washerwoman's sprain; de Quervain's disease; radial styloid tenosynovitis; de Quervain's stenosing tenosynovitis; de Quervain's tendonitis; de Quervain's tendinosis
- › **Anatomical location/body part affected:** Thumb; tendons of muscles that abduct and extend the thumb and radially deviate the wrist; the abductor pollicis longus (APL) and extensor pollicis brevis (EPB)^(2,35)
- › **Area(s) of specialty:** Hand Therapy, Orthopedic Rehabilitation
- › **Description**
 - De Quervain's syndrome (DS) is a painful condition of the wrist, with the pain proximal to the radial styloid at the first dorsal compartment⁽³⁵⁾
 - Stenosis of the first dorsal compartment of the wrist is present⁽³⁾
- › **ICD-10 codes**
 - M65.4 radial styloid tenosynovitis (de Quervain's)

(ICD codes are provided for the reader's reference, not for billing purposes)

- › **Reimbursement:** No specific issues or information regarding reimbursement has been identified
- › **Presentation/signs and symptoms**
 - DS is usually a unilateral condition
 - Pain felt at the base of the thumb increases with wrist ulnar deviation and with thumb abduction
 - Difficulty with pinching, gripping, and holding
 - Tenderness just distal to radial styloid
 - Decreased thumb mobility
 - Guarding of hand/wrist

Causes, Pathogenesis, & Risk Factors

- › **Causes**
 - Gradual symptom onset is associated with microtrauma to APL and EPB tendons at extensor retinaculum overlying radial styloid⁽²⁾
 - Repetitive radial and ulnar deviation of wrist in combination with thumb use (e.g., pinching, wringing out a cloth, knitting, crocheting) can exacerbate symptoms⁽²⁾
 - Sudden onset can occur after blunt trauma to thumb and/or wrist or after unaccustomed activity involving forceful ulnar deviation with eccentric component (e.g., hammering)
 - Care of a neonate (e.g., lifting, diapering, supporting the head) can cause or exacerbate symptoms secondary to repetitive wrist and thumb use, especially forceful grasp and wrist deviation
 - Activities involving repetitive thumb use or forceful gripping with ulnar deviation (e.g., hammering, golf or racquet sports) are also potential causes⁽³⁵⁾

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› Pathogenesis

- Myxoid degeneration (i.e., degenerative process within connective tissue that results in an increase in mucopolysaccharides) occurs within the tendon sheath^(4,5)
- Absence of acute or chronic inflammatory cellular processes^(4,5)
- Fibrous thickening of tendon sheaths at radial styloid^(4,5,22)
- Focal bony abnormalities at radial styloid (e.g., bony crest)⁽²²⁾
- Increased vascularity within the tendon sheath^(4,5)
- Septation of the first dorsal compartment may be associated with development of DS. Authors of a cadaveric study designed to assess the length of septation and incidence of its occurrence found an incidence of 50% and a mean septum length of 5 mm⁽³¹⁾

› Risk factors

- More common in women, in 3rd trimester of pregnancy and postpartum⁽³⁾
 - Constant supporting of the head of a newborn (wrist in flexion and ulnar deviation with the thumb in extension)⁽¹⁾
 - Endocrine changes during pregnancy resulting in fluid retention have been presumed to contribute to this condition, especially when symptoms preceded infant care⁽¹⁾
- Tennis (especially with eastern grip),⁽⁶⁾ golf,⁽³⁾ fly fishing,⁽³⁾ wrestling, bowling
- Carpentry, video games,⁽⁸⁾ mobile phone use,⁽⁹⁾ knitting, needlepoint
- In a prospective cohort study conducted in Germany designed to assess risk factors for DS, the investigators found that neither heavy manual labor nor trauma was a risk factor for DS⁽²³⁾
 - 189 DS patients were compared to 198 patients with wrist ganglia (control group). A self-report methodology was used to assess risk factors
 - The two groups did not differ significantly with regard to type of work, amount of manual force level, computer use, or repetitive work
- Authors of a cohort study conducted in Taiwan found the prevalence rate for DS to be 0.49%, with the prevalence rate for women twice that seen in men. They concluded that the combination of hormonal changes and mechanical loading of the hand can result in development of tendinopathies⁽²⁹⁾
- The authors of a study conducted in the United States designed to assess a genetic predisposition for developing DS found that rs35360670 on chromosome 8 is significantly associated with development of the condition. The researchers analyzed 4,129 cases and 98,374 control subjects for this genome-wide study⁽²⁷⁾

Overall Contraindications/Precautions

- › Potential complicating factors that might indicate need for surgical consult
 - Conservative treatment fails after 3–6 months⁽³⁵⁾
 - Rupture of the APL tendon has been reported in DS cases following corticosteroid injection as a component of nonoperative treatment.⁽¹¹⁾ Hypopigmentation around the injection site may also occur⁽³⁴⁾
 - Triggering or locking of thumb⁽¹²⁾
 - Snuffbox tenderness suggestive of scaphoid fracture
- › Numbness and paresthesia are uncommon unless a neuroma is involved
- › See specific **Contraindications/precautions to examination** and **Contraindications/precautions** under Assessment/Plan of Care

Examination

- › **Contraindications/precautions to examination**
 - See **Overall Contraindications/Precautions**, above

› History

• History of present illness/injury

–Mechanism of injury or etiology of illness

- Document any suspected mechanisms of injury; document any change in activities (work or leisure) that might have occurred around the time of onset (e.g., knitting several blankets for a charity event, building a deck after work, using new office equipment, caring for a newborn, changing grip in tennis)
- The findings of a retrospective study of 41 patients referred to a hand service in the United Kingdom suggest that in some cases of DS recalcitrant to conservative treatment there may also be an underlying wrist condition, often caused by trauma.⁽²⁴⁾ Document any history of wrist or hand trauma

–Course of treatment

- **Medical management:** Steroid injection might be helpful

- Authors of a 2013 systematic review with meta-analysis of 2 RCTs found that steroid injection is an effective form of conservative management for DS and that the number needed to treat was 2 (i.e., for every 2 patients who receive steroid injections, only 1 is likely to benefit)⁽¹⁷⁾
- The authors of a retrospective review of 222 cases of DS treated at a single institution in the United States found that 73% of the patients had resolution of symptoms following 1 injection and 51.8% following 2 injections. Factors associated with injection failure were female sex and BMI > 30⁽²⁶⁾

- **Surgical management:** Most patients with DS do not require surgery. However, operative intervention might be indicated to release the involved tendon compartment in recalcitrant cases

- The authors of a survey of members of the American Society for Surgery of the Hand designed to study postoperative immobilization following common hand surgeries found that patients were immobilized for an average of 1.5 weeks. The findings were based on the responses of 1,126 surgeons. There was very little variability between surgeons, regardless of years in practice, in the duration of immobilization following surgical release⁽²⁵⁾

- **Medications for current illness/injury:** Determine what medications clinician has prescribed; are they being taken? Oral analgesics such as NSAIDs and/or a corticosteroid injection⁽³⁾ may have been prescribed

- **Diagnostic tests completed**

- DS is most often diagnosed by clinical examination⁽³⁾
- Plain radiographs might be obtained in difficult cases to rule out degenerative arthritis of thumb carpometacarpal joint,⁽³⁾ fracture (scaphoid), or dislocation (scapholunate)
- If deemed necessary, MRI might be used to assist in differential diagnosis⁽³⁾
- Ultrasound might be useful to assess anatomic variations (e.g., septation of the compartment) and to assist with injection^(3,22)

- **Home remedies/alternative therapies:** Document any use of home remedies (e.g., ice, heating pack) or alternative therapies (e.g., acupuncture) and whether or not they help

- There might be a role for acupuncture in the treatment of DS. A specific needling technique might be effective⁽¹⁹⁾
- An RCT conducted in Iran was designed to compare acupuncture versus corticosteroid injection in the treatment of DS. Thirty patients were randomly assigned to receive either acupuncture or injection and were also asked to wear a thumb spica splint and to avoid forceful hand use. Both groups demonstrated significant improvements on *QuickDASH* scores and pain visual analog scale (VAS) at 6 weeks post treatment, with slightly better (but not significantly different) outcomes in the injection group at 6 weeks.⁽²⁰⁾ The short-term follow-up and use of splinting by both groups, as well as the cost of the acupuncture treatments compared to the injection, are weaknesses of the study⁽²¹⁾

- **Previous therapy:** Document whether patient has had occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful

–**Aggravating/easing factors** (and length of time each item is performed before the symptoms come on or are eased)

–**Body chart:** Use body chart to document location and nature of symptoms. Patients usually complain of tenderness just distal to radial styloid

–**Nature of symptoms:** Document nature of symptoms (constant vs intermittent, sharp, dull, aching, burning, numbness, tingling). Patients usually complain of tenderness. Numbness and tingling are uncommon unless a neuroma is involved

–**Rating of symptoms:** Use a VAS or 0–10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if **pain** is present now and how much)

- **Pattern of symptoms:** Sudden or gradual onset? Document changes in symptoms throughout the day and night, if any (a.m., mid-day, p.m., night); also, document changes in symptoms due to weather or other external variables
- **Sleep disturbance:** Document number of awakenings/night
- **Other symptoms:** Document other symptoms patient might be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician
- **Barriers to learning**
 - Are there any barriers to learning? Yes ___ No ___
 - If Yes, describe _____
- **Medical history**
 - **Past medical history**
 - **Previous history of same/similar diagnosis:** Any recent or old trauma to thumb/hand? History of hand arthritis? History of prior DS?
 - **Comorbid diagnoses:** Ask patient about other problems; for example, diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders, orthopedic disorders
 - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including OTC drugs and supplements)
 - **Other symptoms:** Ask patient about other symptoms he/she might be experiencing
- **Social/occupational history**
 - **Patient's goals:** Document what the patient hopes for favorable outcomes with therapy
 - **Vocation/avocation and associated repetitive behaviors, if any:** Activities that increase risk include handling of an infant,⁽¹⁾ tennis,⁽⁶⁾ volleyball,⁽⁷⁾ wrestling, bowling, carpentry, video games,⁽⁸⁾ mobile phone use,⁽⁹⁾ knitting, and needlepoint
 - **Functional limitations/assistance with ADLs/adaptive equipment:** What if any daily activities are limited? Patients usually complain of decreased ability to grip, pinch, and hold with affected hand
- › **Relevant tests and measures: (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)**
 - **Assistive and adaptive devices:** Assess for proper fit of supportive wrist hand thumb orthosis (also known as forearm-based thumb spica splint)
 - **Circulation:** Perfusion of thumb/hand should be normal
 - **Cranial/peripheral nerve integrity**
 - Cervical scan to rule out radicular wrist pain
 - Digital sensation should be normal
 - Involvement of radial nerve is uncommon
 - Expect negative Tinel percussion test unless a ganglion cyst/neuroma is present in the painful area
 - **Edema:** Swelling may be seen at the radial side of the wrist along the first dorsal compartment. Volumetric or girth measurements can be used to quantify the edema
 - **Joint integrity and mobility**
 - Distraction, compression, and passive accessory motion of the thumb joints should be normal and not painful in uncomplicated DS
 - The carpometacarpal and radiocarpal joints might be hypomobile in patients with arthritis
 - **Muscle strength**
 - Assessment of thumb pinch strength with accurate gauge provides objective outcome measure
 - Test handgrip strength with a hand dynamometer
 - Resisted thumb abduction is painful, especially in wrist flexion (see Brunelli's test in *Special tests specific to diagnosis*, below)
 - **Observation/inspection/palpation** (including skin assessment)
 - Color and appearance of skin should not be different from unaffected side
 - Assess for tenderness, thickening of EPB and APL tendons, edema, and crepitus at radial styloid; tenderness should be localized between 1st extensor compartment and carpometacarpal joint with no specific bony tenderness, except at radial styloid in advanced cases
 - **Pain:** Assess for pain (VAS) at rest and with movement of the thumb and wrist, as well as in gripping and functional tasks

- **Range of motion:** Active and passive ROM typically are equal and within the norms for the thumb and wrist joints; overpressure at end-range wrist flexion, radial deviation, and ulnar deviation might aggravate symptoms if the radiocarpal joint is involved
- **Sensory testing:** Assess for numbness or paresthesia. Numbness and paresthesia are uncommon unless a neuroma is involved
- **Special tests specific to diagnosis**
 - Finkelstein’s test: The examiner deviates the wrist in the ulnar direction while patient clenches the fully flexed thumb in a fist. This test is considered positive if pain is elicited with the maneuver, as it places more stress on the EPB tendon⁽¹³⁾
 - Brunelli’s test is positive if resisted thumb abduction during active wrist flexion reproduces symptoms
 - *QuickDASH*: A patient-rated outcome measure that uses 11 questions (3 bodily functions and structure items and 8 activity/participation items). Two optional modules, consisting of 4 questions each, rate work and performing arts/sports

Assessment/Plan of Care

› **Contraindications/precautions**

- **Only those contraindications/precautions applicable to this diagnosis are mentioned below, including with regard to modalities. Rehabilitation professionals should always use their professional judgment in their assessment and treatment decisions**
- Clinicians should follow the guidelines of their clinic/hospital and what is ordered by the patient’s physician. The summary below is meant to serve as a guide, not to replace orders from a physician or specific clinical protocols
- Patients who have undergone surgery should be monitored for postoperative complications such as infection, hematoma, and wound dehiscence

› **Contraindications/precautions to use of modalities**

- **Cryotherapy** contraindications⁽¹⁴⁾
 - Raynaud’s syndrome
 - Cryoglobulinemia
 - Cold urticaria
 - Paroxysmal cold hemoglobinuria
 - Impaired circulation
 - Over area of peripheral nerve regrowth
 - Cold intolerance
 - Over area of peripheral vascular disease
- **Cryotherapy** precautions⁽¹⁴⁾
 - Hypertension
 - Thermoregulatory disorders
 - Over an open wound
 - Over superficial nerves
 - Very young or very old
 - Poor cognition
 - Personal aversion to cold
- **Thermotherapy** contraindications⁽¹⁴⁾
 - Decreased circulation
 - Decreased sensation
 - Acute/subacute traumatic and inflammatory conditions
 - Skin infections
 - Impaired cognition or language barrier
 - Malignant tumors
 - Tendency for hemorrhage or edema
 - Heat rubs
- **Therapeutic ultrasound** contraindications include; do not use:⁽¹⁴⁾
 - Over the region of a cardiac pacemaker or other implanted electronic devices
 - Over the pelvis, abdominal, and lumbar regions during pregnancy
 - In an area with infection or bleeding

- If a tumor or malignancy is present in the area
- Impaired circulation, sensation, or cognition
- In the area of a deep vein thrombosis (DVT) or thrombophlebitis
- Over the heart, stellate, or cervical ganglia
- Over open epiphyseal plates

- **Therapeutic ultrasound** precautions include:⁽¹⁴⁾

- Sensory deficits
- Ineffective communication skills in a patient (e.g., impaired cognition, language barrier)
- Circulatory impairments
- Plastic or metal implants
- Always decrease ultrasound intensity if the patient complains of discomfort

- **Electrotherapy** contraindications⁽¹⁴⁾

- Do not place electrodes near:
 - Carotid bodies, cardiac pacemakers or implantable cardioverter defibrillators (ICDs), phrenic nerve or urinary bladder stimulators, phrenic nerve, eyes, gonads, areas with known peripheral vascular disease, areas with hemorrhage, areas with active osteomyelitis
- Impaired sensation, mental status, communication
- Cardiovascular disease (e.g., uncontrolled hyper- or hypotension, irregular heart rate)
- Malignancy/neoplasms
- Electrodes near compromised skin or neck/craniofacial regions in patients with a history of seizures or cerebrovascular accident (CVA)
- Proximity of electromagnetic radiation
- In pregnant women, near the pelvis, lumbar spine, hips, abdomen, or those with history of spontaneous abortion

- Precautions for **low-level laser therapy (LLLT)**⁽¹⁴⁾

- Goggles with an appropriate optical density rating should be worn
- Do not use LLLT in patients with epilepsy, fever, malignancy, decreased sensation, or infection. Avoid using LLLT over the epiphyseal plates in skeletally immature children or over the gonads, sympathetic ganglia, vagus nerve, or mediastinum

- Contraindications to use of LLLT⁽¹⁴⁾

- Do not use laser with pregnant women
- Do not use over the unclosed fontanelles of children
- Do not use over cancerous lesions, the cornea, endocrine glands, or hemorrhaging lesions

› **Diagnosis/need for treatment:** Painful thumb/wrist condition that reduces handgrip strength, mobility, and functional capacity for regular activities

› **Rule out**

- Carpometacarpal⁽³⁾ and radiocarpal arthritis
- C6 cervical radiculitis (main feature is neck pain/trauma)
- Carpal tunnel syndrome (distinguishing symptoms involve first 3 digits and nocturnal pain)
- Raynaud's syndrome (all fingers cold and bluish)
- Cervical cord compression (bilateral symptoms)
- Wartenberg's radial neuritis (for more information, see *Clinical Review...Wartenberg's Radial Neuritis*; CINAHL Topic ID Number: T708576) often coexists with DS⁽¹⁵⁾
- Ganglion cyst⁽³⁾
- Scaphoid fracture⁽³⁾
- Scapholunate ligament tear⁽³⁾
- Dorsal wrist ganglion⁽³⁾
- Flexor carpi radialis tendonitis or wrist extensor tendonitis⁽³⁾
- Intersection syndrome⁽³⁾
- Trigger thumb⁽³⁾
- Radial styloid fracture

- Brachial artery thrombosis⁽³²⁾

› **Prognosis**

- No prognostic studies were identified to predict recovery time and functional outcome following conservative care for DS
- Uncomplicated DS is self-limiting, provided the aggravating activity is avoided. Most patients with postpartum DS recover after 6 months⁽¹⁰⁾
- Rehabilitation time for return to ADLs depends in large part on avoidance of aggravating activities. Some competitive athletes can return to play (depending on the demands of the sport) before full resolution if they are taped or splinted. Athletes should be able to demonstrate the ability to perform without impairment or risk of reinjury⁽²⁾

› **Referrals to other disciplines:**

- Occupational therapist for functional deficits, orthotic fabrication
- Acupuncturist for alternative pain management
- Hand surgeon if 3 to 6 months of conservative treatment fails. Surgical decompression of 1st dorsal extensor compartment or release of APB tendon might be recommended⁽³⁵⁾

› **Treatment summary**

- The authors of a systematic review designed to assess the effectiveness of hand therapy compared to corticosteroid injection in the treatment of DS found that the combined use of an injection and orthosis is better than either used alone. Interestingly, the authors found no studies assessing the efficacy of other components of hand therapy (e.g., exercise, manual therapy, physical agent modalities)⁽³⁰⁾
- A study was conducted in India in which 30 patients (15 per group) were randomly assigned to receive either ultrasound (1MHz at 1.5 w/cm² x 8 minutes with conducting gel) or phonophoresis with diclofenac gel and same ultrasound settings, 3 times per week for 3 weeks. The study researchers indicated that both ultrasound and phonophoresis resulted in significantly improved pain and grip strength for both groups and significantly greater pain reduction in the phonophoresis group compared to the ultrasound group⁽¹⁸⁾
- Authors of a randomized controlled clinical trial conducted in Iran propose a new orthosis design that allows wrist flexion and extension while immobilizing the thumb and restricting radial and ulnar deviation. The authors found no significant differences in pain and strength between the orthoses but report significantly greater satisfaction in the patients using the dynamic orthosis. This small study included a cohort of 12 patients, all women, randomly assigned to receive either a static thumb spica orthosis or a dynamic orthosis⁽²⁸⁾

Problem	Goal	Intervention	Expected Progression	Home Program
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Pain and edema	Resolve pain and edema	<p><u>Prescription, application of devices</u></p> <p>Administer supportive wrist hand thumb orthosis, which does not need to cover the interphalangeal joint since the extensor pollicis longus usually is not involved. The orthosis should be worn full-time, but time worn can decrease as symptoms improve⁽²⁾</p> <p><u>Kinesio taping</u> ⁽³³⁾</p> <p><u>Physical agents and thermal modalities</u></p> <p>Regular ice pack and ice massage to control pain and edema; moist heat for cases with joint stiffness^(2,14)</p> <p><u>Electrotherapeutic modalities</u></p> <p>Ultrasound, phonophoresis, and low-level laser might be effective in decreasing pain^(18,36)</p> <p><u>Manual therapy</u></p> <p>Gentle transverse friction massage over EPB and APL tendons</p>	N/A	Modify aggravating activities; caution against pinching and repetitive thumb movements
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Reduced ROM, strength, and function	Restore ROM, strength, and function	Therapeutic exercises Gentle active ROM exercises in all thumb directions to maintain mobility; isometric thumb exercises (in neutral position) in acute and subacute stages, progressing to hand and wrist strengthening exercises, as tolerated ⁽²⁾	Functional training Progress to exercises that strengthen thumb and wrist for work or daily activities	Thumb and wrist strengthening exercises appropriate for stage of healing
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Desired Outcomes/Outcome Measures

- › Decreased pain
 - VAS
- › Decreased edema
 - Circumferential measurement
 - Volumetric measurement
- › Restored thumb ROM
 - Goniometry
- › Improved strength
 - Grip and pinch strength (dynamometer and pinchmeter)
- › Improved functional hand use and return to prior activities
 - *QuickDASH*

Maintenance or Prevention

- › Avoid or modify aggravating activities as much as possible⁽¹⁶⁾

Patient Education

- › See “De Quervain’s Tendinosis,” American Academy of Orthopaedic Surgeons, <https://www.orthoinfo.org/en/diseases--conditions/de-quervains-tendinosis#Treatment>
- › See “De Quervain’s Tenosynovitis,” American Society for Surgery of the Hand, <https://handcare.assh.org/Anatomy/Details-Page/ArticleID/27956/de-Quervain-Tenosynovitis>
- › See “De Quervain Tendinopathy,” American Society of Hand Therapists, <https://www.asht.org/sites/default/files/docs/2018/DeQuervain%202018.pdf>

Coding Matrix

References are rated using the following codes, listed in order of strength:

M Published meta-analysis	RV Published review of the literature	PP Policies, procedures, protocols
SR Published systematic or integrative literature review	RU Published research utilization report	X Practice exemplars, stories, opinions
RCT Published research (randomized controlled trial)	QI Published quality improvement report	GI General or background information/texts/reports
R Published research (not randomized controlled trial)	L Legislation	U Unpublished research, reviews, poster presentations or other such materials
C Case histories, case studies	PGR Published government report	CP Conference proceedings, abstracts, presentation
G Published guidelines	PFR Published funded report	

References

1. Anderson SE, Steinbach LS, De Monaco D, Bonel HM, Hurtienne Y, Voegelin E. "Baby wrist": MRI of an overuse syndrome in mothers. *AJR Am J Roentgenol.* 2004;182(3):719-724. (R)
2. Goel R, Abzug JM. de Quervain's tenosynovitis: a review of the rehabilitative options. *Hand.* 2015;10:1-5. doi:10.1007/s11552-014-9649-3. (GI)

3. Waters C, Stevenson J. De Quervain tenosynovitis. In: Domino FJ, ed. *The 5-Minute Clinical Consult 2019*. 27th ed. Philadelphia, PA: Wolters Kluwer Health; 2019:242-243. **(GI)**
4. Clarke MT, Lyall HA, Grant JW, Matthewson MH. The histopathology of de Quervain's disease. *J Hand Surg Br*. 1998;23(6):732-734. **(RV)**
5. Read HS, Hooper G, Davie R. Histological appearances in post-partum de Quervain's disease. *J Hand Surg Br*. 2000;25(1):70-72. **(GI)**
6. Gil JA, Kakar S. Hand and wrist injuries in tennis players. *Curr Rev Musculoskelet Med*. 2019;12(2):87-97. doi:10.1007/s12178-019-09550-w. **(RV)**
7. Rossi C, Cellocchio P, Margaritondo E, Bizzarri F, Costanzo G. De Quervain disease in volleyball players. *Am J Sports Med*. 2005;33(3):424-427. **(R)**
8. Reinstein L. De Quervain's stenosing tenosynovitis in a video games player. *Arch Phys Med Rehabil*. 1983;64(9):434-435. **(C)**
9. Iwata K. Smartphone-induced tendinitis: a case report. *J Family Med Prim Care*. 2019;8(5):1784-1785. doi:10.4103/jfmpc.jfmpc_230_19. **(C)**
10. Capasso G, Testa V, Maffulli N, Turco G, Piluso G. Surgical release of de Quervain's stenosing tenosynovitis postpartum: can it wait? *Int Orthop*. 2002;26(1):23-25. **(R)**
11. Boussakri H, Bouali A. Subcutaneous rupture of the extensor pollicis longus tendon after corticosteroid injections for DeQuervain's stenosing tenosynovitis. *Case Rep Orthop*. 2014;2014:1-4. doi:10.1155/2014/934384. **(C)**
12. Alberton GM, High WA, Shin AY, Bishop AT. Extensor triggering in de Quervain's stenosing tenosynovitis. *J Hand Surg Am*. 1999;24(6):1311-1314. **(R)**
13. Kutsumi K, Amadio PC, Zhao C, Zobitz ME, Tanaka T, An KN. Finkelstein's test: a biomechanical analysis. *J Hand Surg Am*. 2005;30(1):130-135. **(R)**
14. Bellew JW, Michlovitz JL, Nolan TP Jr, eds. *Michlovitz's Modalities for Therapeutic Intervention*. 6th ed. Philadelphia, PA: FA Davis; 2016. **(GI)**
15. Lanzetta M, Foucher G. Association of Wartenberg's syndrome and de Quervain's disease: a series of 26 cases. *Plast Reconstr Surg*. 1995;96(2):408-412. **(R)**
16. Hubbard M, Hildebrand B, Battafarano M, Battafarano D. Common soft tissue musculoskeletal pain disorders. *Prim Care*. 2018;45(2):289-303. doi:10.1016/j.pop.2018.02.006. **(GI)**
17. Ashraf MO, Devadoss VG. Systematic review and meta-analysis on steroid injection therapy for de Quervain's tenosynovitis in adults. *Eur J Orthop Surg Traumatol*. 2014;24(2):149-157. doi:10.1007/s00590-012-1164-z. **(SR)**
18. Shah H, Dongre B. A study to determine the effect of ultrasound and phonophoresis in De Quervain's diseases. *Indian J Physiother Occup Ther*. 2014;8(2):224-229. doi:10.5958/j.0973-5674.8.2.090. **(R)**
19. da Silva JBG, Batigalia F. Acupuncture in De Quervain's disease: a treatment proposal. *Acupunct Med*. 2014;32(1):70-72. doi:10.1136/acupmed-2013-010486. **(X)**
20. Hadianfard M, Ashraf A, Fakheri M, Nasiri A. Efficacy of acupuncture versus local methylprednisolone acetate injection in De Quervain's tenosynovitis: a randomized controlled trial. *J Acupunct Meridian Stud*. 2014;7(3):115-121. doi:10.1016/j.jams.2013.10.003. **(RCT)**
21. Meals RA. Efficacy of acupuncture for De Quervain's tenosynovitis. *J Acupunct Meridian Stud*. 2015;8(1):1. doi:10.1016/j.jams.2014.11.006. **(X)**
22. Lee KH, Kang CN, Lee BG, Jung WS, Kim di Y, Lee CH. Ultrasonographic evaluation of the first extensor compartment of the wrist in de Quervain's disease. *J Orthop Sci*. 2014;19(1):49-54. doi:10.1007/s00776-013-0481-3. **(R)**
23. Stahl S, Vida D, Meisner C, Stahl AS, Schaller HE, Held M. Work related etiology of de Quervain's tenosynovitis: a case-control study with prospectively collected data. *BMC Musculoskelet Disord*. 2015;15:126. doi:10.1186/s12891-015-0579-1. **(R)**
24. Redvers-Chubb K. De Quervain's syndrome: it may not be an isolated pathology. *Hand Ther*. 2016;21(1):25-32. doi:10.1177/1758998315599796. **(R)**
25. Diaz R, Ebramzadeh E, Yao J. Variations in postoperative immobilization following common hand surgery procedures. *Hand (NY)*. 2016;11(1):45-49. doi:10.1177/1558944715617221. **(R)**
26. Oh JK, Messing S, Hyrien O, Hammert W. Effectiveness of corticosteroid injections for treatment of de Quervain's tenosynovitis. *Hand (NY)*. 2017;12(4):357-361. doi:10.1177/1558944716681976. **(R)**
27. Kim SK, Ahmed MA, Avins AL, Ioannidis PA. A genetic marker associated with de Quervain's tenosynovitis. *Int J Sports Med*. 2017;38:942-948. doi:10.1055/s-0043-116669. **(R)**
28. Nemati Z, Javanshir MA, Saeedi H, Farmani F, Fesharaki A. The effect of new dynamic splint in pinch strength in de Quervain syndrome: a comparative study. *Disabil Rehabil Assist Technol*. 2017;12(5):457-461. doi:10.3109/17483107.2016. **(RCT)**
29. Shen P, Chang P, Jou I, Chen C, Lee F, Hsieh J. Hand tendinopathy risk factors in Taiwan: a population-based cohort study. *Medicine (Baltimore)*. 2019;98(1):e13795. doi:10.1097/md.00000000000013795. **(R)**
30. Cavaleri R, Schabrun S, Te M, Chipchase L. Hand therapy versus corticosteroid injections in the treatment of de Quervain's disease: a systematic review and meta-analysis. *J Hand Ther*. 2016;29(1):3-11. doi:10.1016/j.jht.2015.10.004. **(SR)**
31. Gao Z, Tao H, Xu H, Xue J, Ou-Yang Y, Wu J. A novel classification of the anatomical variations of the first extensor compartment. *Medicine (Baltimore)*. 2017;96(35):e7875. doi:10.1097/md.00000000000007875. **(R)**
32. A##rman M, Tolu S, Baskan O, Ustun I. Brachial artery thrombosis mimicking De Quervain's syndrome: a case report. *Turkish J Phys Med Rehabil*. 2017;63(3):272-274. doi:10.5606/tftrd.2017.17802. **(C)**
33. D'Angelo K, Sutton D, Côté P, et al. The effectiveness of passive physical modalities for the management of soft tissue injuries and neuropathies of the wrist and hand: a systematic review by the Ontario Protocol for Traffic Injury Management (OPTIma) Collaboration. *J Manipulative Physiol Ther*. 2015;38(7):493-506. doi:10.1016/j.jmpt.2015.06.006. **(SR)**
34. Fiorito-Torres F, Murphy D, Perloff M. No pain, no pigment. *Am J Phys Med Rehabil*. 2016;95(1):e9. doi:10.1097/phm.0000000000000385. **(C)**
35. Wagner E, Gottschalk M. Tendinopathies of the forearm, wrist, and hand. *Clin Plast Surg*. 2019;46(3):317-327. doi:10.1016/j.cps.2019.02.005. **(GI)**
36. Sharma R, Bhatt S, Kumar S, Bhargava S, Aggarwal A. Outcome of low level lasers versus ultrasonic therapy in de Quervain's tenosynovitis. *Indian J Orthop*. 2015;49(5):542. doi:10.4103/0019-5413.164050. **(R)**