



## **Standard of Care: de Quervain's Syndrome: Nonoperative Management**

### **Case Type / Diagnosis / Anatomy:**

Since the first description of “washerwoman’s sprain”<sup>11</sup> tenosynovitis of the first dorsal compartment has become a commonly recognized inflammatory disorder. The wrist contains six extensor compartments and the most radial, on the dorsum of the wrist, is occupied by the extensor pollicis brevis and abductor pollicis longus. The tendons are enveloped in an osseofibrous canal lined by synovium and when subjected to excessive or repetitive stress may result in pain, swelling and decreased thumb motion. In 1895, Fritz de Quervain, a Swiss surgeon,<sup>1</sup> was first credited with the recognition of this syndrome and so it bore his name. More accurately, Tillaux<sup>2</sup> and Gray<sup>3</sup> referred to this disorder before de Quervain.

### **Anatomy:**

Twenty-four extrinsic tendons cross the wrist and provide power and dexterity in the hand. Each tendon passes through a series of tight fibrous-osseous canals designed to optimize the balance between motion and force production by maintaining the tendon in close approximation to the joint or joints it controls. There are six separate compartments under the dorsal carpal ligament each lined with a separate synovial sheath membrane. The first one is over the radial styloid and it contains the abductor pollicis longus and the extensor pollicis brevis tendons. These tendons pass through an unyielding osteoligamentous tunnel formed by a shallow groove in the radial styloid process and a tough overlying roof composed by the transverse fibers of the dorsal ligament. This fibrous tunnel is about 2 cm long, whereas the synovial sheath extends from each musculotendinous junction proximal to the tendon insertions well beyond the tunnel itself. Division or rupture of a critical retinacular ligament or pulley, will allow the tendon to drift away from the joint’s center of rotation and therefore increase the moment arm for force production but also lengthens the tendon which limits the excursion of the joint<sup>21</sup>

### **ICD9: 727.05**

### **Causes of de Quervain's Syndrome and Demographics:**

The three most common causes of stenosing tenovaginitis appear to stem from work related activities, repetitive active gripping and pinching, and direct injury.<sup>13</sup> Tenovaginitis is noted to be more common in women than men. Lapidus<sup>5</sup> reports female/male ratio of 4:1. Medl<sup>6</sup> agreed and felt women outnumbered men two to one. Occupational factors may play a role, but the problem usually is complex. Tendonopathies often cluster in some individuals. Several conditions can exist such as carpal tunnel syndrome, trigger fingers, and lateral epicondylitis. Women, especially those with small children, lead in being afflicted by de Quervains syndrome possibly

from the repetitive lifting of their children or their household tasks. Armstrong et al.<sup>22</sup> stated the risk of hand and wrist tendonopathy in persons who perform highly repetitive or forceful jobs is 29 times greater according to epidemiologic data. It showed that the assemblers, musicians, and meat cutters are often developing this syndrome.

### **Symptom Presentation:**

De Quervain's syndrome includes pain and swelling, along the distal wrist, at the radial styloid. Pain is present on ulnar deviation of the wrist and by flexion and adduction of the thumb or by simple adduction of the thumb.<sup>1</sup>

### **Mechanism of Injury, Chief Complaint:**

Pain on sustained or repetitive thumb abduction with wrist ulnar deviation is now known as cumulative trauma.<sup>4</sup> Opening jars, wringing the hands, cutting with scissors, holding surgical retractors, playing the piano, and doing needlepoint are a few examples of activities that may be the reason for de Quervain's syndrome.<sup>7 8 9 10 11</sup> The chief complaints usually are pain, weakness, and swelling along the radial side of the wrist during these activities.

### **Examination:**

On examination, tenderness is palpable over the first dorsal compartment. This tenderness may be exacerbated by the presence of inflammation of the superficial radial nerve. Severe pain in the region of the radial styloid is common.<sup>4</sup> Discomfort also may be found with resisted thumb extension at the metacarpalphalangeal joint which is indicative of a positive "hitch-hiker's" test.<sup>21</sup> Other causes of the pain need to be eliminated. A useful test was proposed by Finkelstein<sup>12</sup> in<sup>1930</sup> and is found to be positive in most patients with de Quervain's syndrome. The thumb is held in full flexion -adduction, and the wrist is abruptly deviated in an ulnar direction. A sharp pain in the area of the radial styloid is indicative of this diagnosis.<sup>21</sup>

Localized osteopenia in the radial styloid may be noted in a radiologic exam.<sup>21</sup> Calcifications in the area of the first dorsal compartment may be identified, especially in chronic cases. Basal joint arthritis may be painful with thumb motion and may demonstrate a positive Finklestein test. It usually can be distinguished from de Quervain's syndrome by the absence of the first dorsal compartment tenderness. It is common to see both in the older population.<sup>21</sup>

### **Indications for Treatment:**

The initial treatment of a symptomatic patient is aimed toward decreasing the inflammation in the first dorsal compartment. If the provoking activities cannot be eliminated, simple immobilization of the wrist and thumb, with the interphalangeal joint free, in a thumb spica splint, or a long opponens splint, may be effective. Non-steroidal anti-inflammatory medication may also be indicated.<sup>21</sup>

### **Contraindications / Precautions for Treatment:**

Patients who are referred to therapy with the below symptoms typically have a poor prognosis for conservative (nonoperative) treatment.<sup>4</sup>

- Severe pain (> 8/10 on the patient pain analog scale) and inflammation along the radial sensory nerve or of the first extensor compartment.
- Patients who cannot tolerate NSAIDs may progress more slowly due to the inability to sufficiently manage inflammatory conditions.
- Inability to carry over education, written programs and directions to the home and occupational environments.
- The referring physician should be contacted if the patient's symptoms continue to worsen or not respond to conservative treatment despite compliance with the treatment plan.
- Severe swelling of the dorsal first extensor compartment of the wrist.

### **Examination:**

#### **Medical History:**

Assessment begins with a thorough history, including exploration of aggravating activities and associated conditions that may have predisposed the patient to tendonopathies. If the patient has had surgery to decompress the first extensor compartment this operative report needs to be reviewed. Also any previous surgeries in the area such as a trigger finger release or a carpal tunnel release needs to be discussed and documented.

The clinician should carefully review a patient's medical history questionnaire (on an ambulatory evaluation), patient's medical record, and medical history reported in the hospital's computerized medical record. Careful consideration should be made to identify any traumatic history to the affected extremity, rheumatoid illnesses, diabetes or other metabolic disorders. Finally, the clinician should review any diagnostic testing and imaging.

#### **History of Present Illness:**

It is important to obtain a careful and detailed history of the patient's job requirements and activities to reveal any useful information that may be helpful to the objective clinical examination. Obtaining this history helps determine what the occupational activities are that require repetitive gripping or pinching

#### **Medications:**

Patients may be placed on anti-inflammatory medications or receive a mild steroid injection into the first dorsal compartment. Success ranges from 50 to 90% as reported in the literature following one to two injections. In Medl's <sup>6</sup>series, 70 patients with a symptom duration of less

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than 2 months had a success rate of 90%. The patient may be on NSAIDS (non-steroidal anti-inflammatory drugs) as they are the medications of choice for decreasing inflammation and soft tissue swelling leading to nerve compression. Corticosteroids can be injected directly into the first extensor compartment by the MD, and are to relieve the inflammation. This will cause some discomfort initially but may assist in alleviating the pain in patients with mild to moderate symptoms. Non-steroidal anti-inflammatory, (NSAIDS), may promote healing by accelerating the formation of cross-links between the collagen fibers. NSAIDS include aspirin, ibuprofen, naproxen.<sup>4</sup>

## **Injection**

If a physician feels that an injection is indicated a mixture of lidocaine and a soluble corticosteroid solution are typically used. A small 27-or 25- gauge needle is used for injection. The needle is placed in close proximity to the tendon or into the sheath but not into the tendon substance. In general one or two corticosteroid injections are offered to the patient. They are given several weeks to months apart. Corticosteroids inhibit the inflammatory process by inhibiting the prostaglandin synthesis and by reducing migration of white blood cells to the injured area. Steroids inhibit collagen synthesis and therefore weaken tendons if used in excess. Steroids can be administered orally, transcutaneously, or by injection.<sup>4</sup>

## **Social History:**

A review of a patient's home, work environment, and recreational activities should be documented. Information should be obtained on the patient's past and present functional levels and the activities he hopes to resume.

## **Examination** (Physical / Cognitive / applicable tests and measures / other)

This section is intended to capture the minimum data set and identify specific circumstance(s) that might require additional tests and measures.

## **Physical Examination**

**Pain:** As measured on the VAS (Visual Analog Scale) Specify location of pain, activities that increase pain and/or decrease pain.

1. **Pain – Place**
2. **Amount – Pain level VAS (0-10)**
3. **Intensifiers**
4. **Nullifiers**
5. **Effect on Function**
6. **Descriptors (i.e. sharp, dull, constant, throbbing, etc.)**

**Sensation:** Sensation is usually normal but may be hypersensitive to touch due to the amount of inflammation within the first dorsal compartment. The radial sensory branch may be inflamed as well, producing increased sensitivity to the radial border of the wrist.

**Edema:** Objective differences in widths, measurements should be taken bilaterally. Widths measured on documented landmarks, usually the distal wrist and the distal palmar crease, and recorded as circumferential measurements in centimeters. Measurements of the involved wrist are taken and compared to the non-involved wrist either with a tape measure or by the volumetric water displacement method.

**Active and Passive Range of Motion: (A/PROM):** Measure distal bilateral (B) upper extremity (UE) range of motion, (Elbow, forearm, wrist, thumb, digits) noting limitations to range due to pain, and or onset of paresthesias. For mild to moderate de Quervain's symptoms the active range of motion is usually normal.

**MMT/Strength testing:** Specific MMT of the first extensor compartment is not necessary at the initial evaluation but may be indicated at the end of the course of treatment. The abductor pollicis longus originates from the posterior surface of the body of the ulna, distal to the origin of the supinator, interosseus membrane, and posterior surface of the middle one third of the body of the radius. The insertion is at the base of the first metacarpal bone along the radial side. The extensor pollicis brevis originates along the posterior border of the radius distal to the origin of the abductor pollicis longus and interosseus membrane. It inserts at the base of the proximal phalanx of the thumb, dorsal surface. Test by putting pressure against the lateral surface of the distal end of the first metacarpal in the direction of adduction and flexion. Weakness is demonstrated by the inability to abduct the first metacarpal and the inability to abduct the wrist.<sup>4</sup> Strength testing for general grip and pinch strengths can be done when the painful symptoms have subsided. Often it is measured before a course of strengthening exercises. You measure grip strength with the use of a calibrated dynamometer and pinch gauge. Both tests are completed by having the patient squeeze and/or pinch as hard as possible, alternating between hands, and taking the average from three trials. The pinch gauge can measure 3-point as well as lateral or key pinche.<sup>4</sup>

**Functional Assessment:** The use of a specific functional capacity questionnaire is recommended to establish current functional deficits, assist in establishing goals, and to track progress.

Possible tools:

- Michigan Hand Questionnaire
- Manual Ability Measure

**Special Tests:** The best-known provocative test used in a de Quervain's diagnosis is the Finkelstein test.<sup>2</sup> The patient grasps his thumb into his palm and abruptly ulnar deviates his wrist and if positive for de Quervain's syndrome, will produce pain. Tenderness over the first extensor

compartment will also be evident on palpation. Resistive thumb abduction usually produces pain as well.

**Acute (Inpatient (if applicable):**

As Above

**Sub-Acute (Outpatient) (if applicable):**

As Above

**Differential Diagnosis (if applicable):**

Other common problems in the first extensor compartment area of the wrist are carpal metacarpal (CMC) osteoarthritis, a sprained thumb that refers pain into the wrist, a ganglion, tendonitis of the wrist flexor carpi radialis or the wrist extensor carpi radialis brevis and longus.

**Evaluation / Assessment:**

**Establish Diagnosis and Need for Skilled Services**

Patients diagnosed with de Quervain's may benefit from conservative treatment with therapy to assist in minimizing impairment, improving functional status, and reducing the need for surgical intervention.

**Potential Problem List (Identify Impairment(s) and/ or dysfunction(s)):**

- Pain to affected hand and wrist
- Decreased pinch and grip strength of affected hand
- Decreased endurance of affected hand and wrist for repetitive work
- Decreased functional use of affected hand for ADL tasks
- Decreased knowledge for proper positioning techniques, ergonomics and joint protective measures during ADL's and work environment.

**Prognosis**

Research has documented that a single corticosteroid injection into the first dorsal compartment is a moderately effective non-operative treatment choice and it was found that 70% of patients have relief of their symptoms. Two injections are successful in 80% of patients and long-term relief is achieved in 60% of patients. Several studies have documented the high failure rate of injections in patients with a separate extensor pollicis brevis fibro-osseous tunnel within the first

dorsal compartment. It has also been found corticosteroid injections in patients with diabetes mellitus have diminished results.<sup>4</sup>

### **Goals of rehabilitation intervention**

- Resolve symptoms of de Quervain's syndrome and maximize pain relief with ADLs.
- Pt will demonstrate understanding of the home exercise program.
- Regain independence with ADL/leisure/work tasks.
- Goals will reflect individual patient's functional impairments in ADL's, leisure and/or work task.
- Goals to reflect patient's education of body mechanics and ergonomics, including the avoidance of provoking postures and activities.
- If splinting is involved in the treatment program, goals will reflect the patient's independence in their wearing schedule, and the care and hygiene of splints.
- Goals will be measurable and reassessed every 30 days.

### **Age / Other Specific Considerations**

Women who are pregnant or new mothers caring for their babies are at a high risk of developing de Quervain's syndrome.<sup>2</sup> Other susceptible persons are those who do repetitive pinch or gripping or twisting activity on the job or at home.<sup>15</sup> Adaptation of these jobs may be necessary to prevent this inflammatory response and development of de Quervain's syndrome.

### **Treatment Planning / Interventions**

Established Pathway	<input type="checkbox"/> Yes, see attached.	<input checked="" type="checkbox"/> No
Established Protocol	<input type="checkbox"/> Yes, see attached.	<input checked="" type="checkbox"/> No

### **Interventions**

*This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.*

Activity modification and splinting are incorporated. Adapted or alternative equipment that minimizes ulnar deviation at the wrist and substitutes power grip for pinch can be used.

### **Splinting**

Splinting alone may be beneficial for acute symptomatic relief but has resulted in 80% failure rate. Strong evidence in the literature to support the success of splinting is deficient.<sup>19</sup>

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Stern<sup>18</sup> recommended a three- week trial of splinting with the wrist in neutral and the thumb radially abducted. Witt et al<sup>19</sup> reported a 62% satisfactory outcome with injection and splinting the wrist in 20 degrees extension and thumb MP and IP joints in extension.

Weiss et.al.<sup>20</sup> reported only a 30% success rate with splinting alone in 37 patients as compared with 69% success rate for injection alone and 57% for injection plus splint. Weiss et.al.<sup>20</sup> concluded that splinting provided no additional benefit when combined with the cortisone injection. It was the opinion of several authors that splint use in the acute phase can assist with symptom control. The splint can be removed for brief periods of movement in a pain free range. As pain subsides the patient can progress from a rigid splint to a flexible support.

We have found that the long opponens splint helpful in the acute stages of de Quervain's syndrome. We position the thumb in palmer abduction and the wrist in neutral or slight extension. We leave the IP joint free to flex and extend. This splint is worn for one to three weeks with periodic removal to flex and extend the wrist to avoid stiffness.

### **Ergonomic education**

Ergonomic modifications and alterations of any repetitive activity such as lifting an infant or small child, playing the piano, data entry, or needlework are required to prevent recurrence. Proper positioning and joint protection techniques need to be taught. Work and home activities need to be discussed throughout the treatment process so as to address any problems.<sup>22</sup>

**Modalities:** Modalities such as ultrasound, fluidotherapy, superficial heat, iontophoresis or cryotherapy have been used in the conservative treatment of de Quervain's syndrome<sup>4</sup> It should be noted however, that there are inconclusive findings to support or refute the benefits of these modalities. Please refer to specific BWH Rehabilitation modality standards of care for general information on each modality.

### **Strengthening Program:**

Strengthening exercises can be initiated when painful symptoms have subsided. Graded, symptom-free, exercises have been shown to increase metabolism, speed repair, and prepare the patient to meet the physical demands of daily activities.<sup>13 14</sup> Resistive exercises may be done in isometric, isotonic, and isokinetic modes.<sup>4</sup>

Isometric contractures are initiated at a muscle's resting length (roughly midrange). Lowe<sup>18</sup> recommends starting with brief repetitive isometric exercises for the hand and wrist musculature: specifically, 5 reps, 6 seconds each, performed once daily. When isometrics can be performed at multiple joint angles, isotonic exercise can be added. Exercise programs should be tailored to an individual's functional needs.<sup>4</sup> Putty, free weights and theraband are practical for home use.



## **Frequency & Duration**

- Frequency of hand therapy for the conservative management of de Quervain's syndrome is 1-2x/wk for 6 weeks, or as indicated by patient's status and progression. Most patients should meet their clinical goals within 6 visits or 2 months of therapy depending upon severity of presenting signs and symptoms. Progression and improvement will be indicated by the achievement of established short-term goals, and the elimination of symptoms per patient reports, subjective, objective testing.
- Duration of each treatment session is dictated by the patient's needs.

## **Patient / Family Education**

- Instruction of home program with verbal and written instructions
- Expected outcome from conservative therapy regime
- Identification of patient-centered goals
- Education of the patient that conservative treatment program at home may last 3 to 6 months prior to consideration for surgical intervention
- Splint don/doff, wearing schedule and hygiene
- Education on de Quervain's syndrome, basic anatomy and causes

## **Recommendations and Referrals to Other Providers**

- Pt will be referred back to referring physician/surgeon should symptoms persist or deteriorate.

## **Re-evaluation / assessment**

### **Standard Time Frame**

- Goals will be reassessed every 30 days

### **Other Possible Triggers**

- Any significant change in symptoms that has reduced patient's baseline functional level
- Other possible triggers are CMC pain, flexor carpi radialis tendonitis, OA of the CMC joint or a sprained thumb.

## **Discharge Planning**

Discharge planning is in collaboration between the doctor, therapist and patient in meeting the established goals and focusing on returning the patient to pre-morbid activities.

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## Commonly Expected Outcomes at Discharge

- Upon discharge from therapy the patient should be independent with their home program and have returned to their maximal pre-morbid level of function.
- Full resumption of pre-morbid activities and work with awareness of ergonomics, joint protection and proper positioning techniques.
- Patient's discharge instructions: Continued awareness of correct positioning techniques, ergonomics and continuation of the home exercise program.
- Discharge from therapy with a referral back to the MD if the patient has regressed and/or plateaued with intervention. Include a progress note to MD in regard to treatment interventions utilized in therapy and patient's response to these interventions.

## Transfer of Care (if applicable)

Should symptoms persist and/or increase, patient will be referred back to his/her primary care provider or specialist who referred patient to therapy.

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