

# A Review of Anatomical Placement of Corticosteroid Injections for Uncommon Hand, Wrist, and Elbow Pathologies

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## ABSTRACT

Corticosteroid injections are a common nonsurgical treatment of intersection syndrome, flexor carpi radialis tendonitis, flexor carpi ulnaris tendonitis, and medial epicondylitis. The benefits of corticosteroid injections for these conditions have been well studied and documented in the medical literature. Patients with less common upper extremity complaints usually first present to their primary care provider. A correct anatomical diagnosis will help with early definitive treatment, as the injection must be in the proper location for maximal benefit to the patient. The following review on uncommon upper extremity complaints provides information for a correct diagnosis and treatment plan, followed by a possible injection. This review will hopefully provide high quality care while also cutting health care costs by making the correct diagnosis at the initial presentation.

**KEYWORDS:** flexor carpi ulnaris, flexor carpi radialis, intersection syndrome, medial epicondylitis

## INTRODUCTION

Upper extremity complaints are a common cause of patient visits to primary care providers. Quality of life markers can be low in patients with chronic wrist pain.<sup>1</sup> A thorough patient history will help with the diagnosis of most upper extremity conditions, as work activities are a common culprit.<sup>2</sup>

The tendons of the flexors and extensors of the wrist often become inflamed and lead to tenosynovitis,<sup>3</sup> with complaints of swelling and wrist discomfort.<sup>4</sup> Steroid injections can usually help most tenosynovitis or tendonitis conditions in the wrist and forearm. A correct anatomical diagnosis will guide the practitioner as to the injection site. The common types of steroid used in the upper extremity are betamethasone, methylprednisolone, and triamcinolone. We prefer water-soluble steroids such as betamethasone, because they are less likely to cause depigmentation of the skin. The following review is a guide for managing less common upper extremity complaints, through the correct diagnosis and anatomical location for an injection.

## INTERSECTION SYNDROME

Intersection syndrome is a painful disorder of the dorsal forearm caused by inflammation at the crossing point of the tendons of the first and second extensor compartments.<sup>5</sup> It is characterized by pain, swelling and crepitus proximal to Lister's tubercle of the distal radius. Symptoms occur as the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons of the first extensor compartment cross over the extensor carpi radialis longus (ECRL) and extensor carpi radialis brevis (ECRB) tendons in the second extensor compartment. This overuse syndrome has been reported in rowing, canoeing, racket sports, weight lifting, and skiing.<sup>6</sup> Intersection syndrome has also been referred to as peritendinitis crepitans, crossover syndrome, subcutaneous perimyositis, abductor pollicis longus syndrome, and adventitial bursitis.

### Diagnosis

The diagnosis may be difficult because of nonspecific complaints and subtle objective findings.<sup>7</sup> It is important to determine if work activities have contributed to the development of the syndrome. The finding of crepitus over the dorsal forearm with resisted wrist and thumb extension, approximately 4–8 cm proximal to the wrist, helps with diagnosis of this condition.

Symptoms of intersection syndrome vary with the specific location and may include focal, diffuse, or referred pain, swelling, crepitus, weakness, numbness, atrophy, and various vasomotor phenomena. In contrast to deQuervain's tenosynovitis (inflammation of the EPB and APL tendons), in intersection syndrome the area of pain, tenderness, edema is located 4 to 8 cm proximal to the radial styloid; crepitus is present in severe cases.<sup>8</sup>

### Treatment

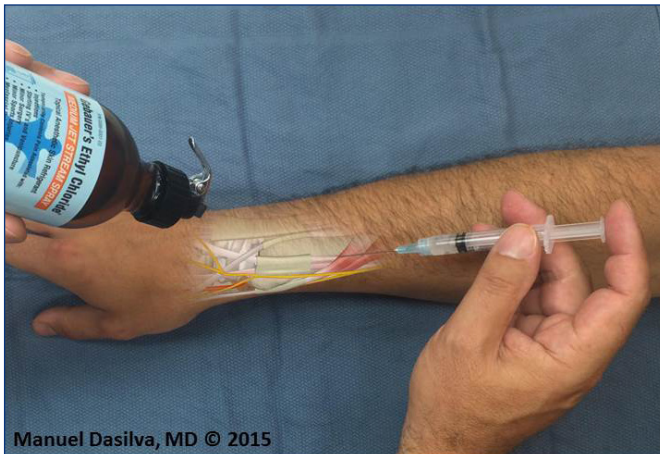
Current management of intersection syndrome includes rest, NSAIDs, splinting, steroid injections and surgical release.<sup>6</sup> Studies have shown that crepitus induced by thumb movement in patients with intersection syndrome may be reduced by taping across the dorsal forearm with force applied in an ulnar direction; taping in the radial direction had no alleviating effects.<sup>9</sup> Proper taping techniques improved upper limb function during the period of taping as well as over a period of one year.

Using a spica splint is also indicated for patients with intersection syndrome. Two or three weeks of immobilizing the forearm with the wrist in 15 degrees of extension

is usually effective in decreasing symptoms.<sup>10</sup> Physical therapy to provide gradual increase in range-of-motion and wrist extensor strengthening has also proven beneficial in some instances.<sup>10</sup>

Corticosteroid injection is recommended for patients who do not improve with conservative treatment.<sup>11</sup> The corticosteroid solution should be injected within the second compartment of the extensor retinaculum, inside the bursae of the ECRL and ECRB tendons (**Figure 1**). In rare cases, surgical debridement and release are indicated in recalcitrant cases of intersection syndrome.

**Figure 1.** Intersection Syndrome Injection



- Clean the area with alcohol or iodine
- Palpate the dorsal radial wrist, typically there is a distinct tender location in the region of the overlap of the 1st and 2nd dorsal compartments approximately 5 cm proximal to the joint. There may be clicking or crepitus in the area with wrist movement.
- Infiltrate the tender area with the mixture of lidocaine/steroid.

**Figure 2.** Flexor Carpi Radialis Tendonitis Injection



- Clean the area with alcohol or iodine
- Palpate the radial artery. The thick tendinous structure immediately ulnar to the artery is the FCR tendon. Typically this tendon will be tender to palpation. If you are too ulnar, you may be palpating the palmaris longus if the patient has one.
- Infiltrate the area with the mixture of lidocaine/steroid to try to fill up the tendon sheath.

## FLEXOR CARPI RADIALIS TENDONITIS

Pain over the flexor carpi radialis (FCR) tendon at the wrist may be caused by stenosing tenosynovitis.<sup>12</sup> The musculotendinous area of the flexor carpi radialis muscle is located approximately fifteen centimeters proximal to the radiocarpal joint and the synovial sheath extends the entire length of the tendon. The tendon enters a fibro-osseous tunnel at the proximal border of the trapezium and is separated from the carpal tunnel by a thick septum that functions as a pivot point for the flexor pollicis longus.<sup>13</sup> FCR tendonitis is caused by narrowing of the tendon sheath due to post-traumatic thickening of the osteofibrous gliding tunnel of the joint between the scaphoid and trapezium.<sup>14</sup> This inflammation in the trapezio-scaphoideal joint may irritate the tendon and lead to tenderness and pain along the radial side of the wrist.<sup>14</sup>

### Diagnosis

Symptoms of flexor carpi radialis tendonitis include pain, tenderness, swelling, warmth, or erythema of the volar wrist.<sup>15</sup> The pain may worsen when flexing the wrist, especially against resistance or when turning the palm down against resistance. Furthermore, patients often feel pain with gripping and have limited mobility of the wrist. Crepitus may occur with wrist flexion. Some patients also experience numbness of the palm or hand secondary to FCR tendinitis.<sup>15</sup>

### Treatment

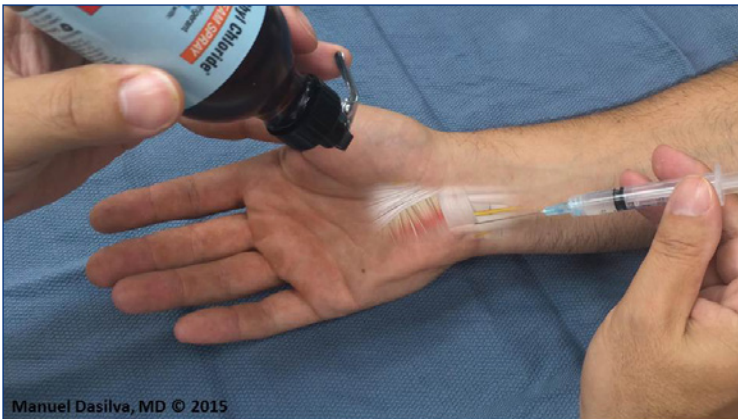
Treatment begins with stopping or limiting activities that increase pain or swelling. Often, modified lifting with the palm facing down provides significant relief. Corticosteroid injections may also be given in the region of the forearm shown below (**Figure 2**). Finally, surgical release of the FCR tendon may help if little or no changes were seen with activity modification or corticosteroid injections.<sup>15</sup>

## FLEXOR CARPI ULNARIS TENDONITIS

Injuries to the flexor carpi ulnaris tendon are typically calcific in nature. Histology from six cases of FCU tendonitis showed findings of angiofibroblastic hyperplasia, with dense populations of hypertrophic plump active fibroblasts, vascular hyperplasia, and disorganized collagen.<sup>16</sup> This histology is distinct from that of a normal tendon, which has tightly packed and highly organized bundles of collagen.<sup>16</sup> If there is concern for an acute triangular fibrocartilage complex (TFCC) tear, referral to a hand surgeon is essential for repair of the injury.

### Diagnosis

Similar to other tendon injuries, FCU tendonitis is probably caused by excessive mechanical overload.<sup>17</sup> Calcific tendinitis in the wrist is rare and is frequently misdiagnosed.<sup>18</sup> Pain due to FCU tendinitis may develop along the anteromedial aspect of the forearm. Common activities leading to FCU tendinitis include excessive keyboard typing, piano playing, or weight lifting.

**Figure 3.** Flexor Carpi Ulnaris Tendonitis Injection

- Clean the area with alcohol or iodine
- Palpate the pisiform on the volar wrist. The tendon of the FCU can be palpated as you walk your fingers proximally on the forearm.
- Infiltrate the tendon sheath with the mixture of lidocaine/steroid to try to fill up the tendon sheath. Make sure to aspirate prior to injecting to make sure you are not in the ulnar artery.

### Treatment

Treatment is similar to that of FCR tendinitis. The patient should modify activities by cutting back on aggravating factors of the wrist/forearm pain, and a removable brace for temporary immobilization may also help.<sup>18</sup> Corticosteroid injection can be placed in the region shown below (Figure 3). As with FCR tendinitis, if these measures are not effective, tendon release surgery may be performed on the flexor carpi ulnaris tendon/muscle.

### MEDIAL EPICONDYLITIS

Medial epicondylitis is an overuse injury commonly found in golfers and baseball players that results in pain.<sup>19</sup> Medial epicondylitis has a prevalence of 4% to 13% in the general population,<sup>20</sup> but can be up to 20% in athletes.<sup>21</sup> Medial epicondylitis has been noted in athletes of many different sports including bowling, racquetball, football, archery, weightlifting, and javelin throwing. It is also associated with many occupations in which repetitive writ flexion and pronation are required, such as carpentry.<sup>23</sup>

The main symptom of medial epicondylitis is pain on the medial aspect of the elbow, especially when the player acts to pronate or flex the wrist while holding on to a golf club or baseball. This pain prevents athletes from using as much force as they could prior to injury. Another characteristic of medial epicondylitis is pain with palpation at the medial aspect of the wrist flexor muscle group. Medial elbow pain usually occurs with acceleration of the arm while swinging a golf club or throwing a ball. It is also seen with increased valgus torque of the elbow, which causes traction at the junction between the wrist flexor muscle group and the medial epicondyle of the elbow.<sup>22</sup>

**Figure 4.** Medial Epicondylitis Injection

- Clean the area with alcohol or iodine
- Palpate the medial epicondyle and forearm flexor tendon. This may be easier if the patient's elbow is flexed. Try to feel the ulnar nerve so as to avoid injecting the nerve.
- The steroid and local anesthetic injection is infiltrated into the area around the forearm flexor tendon.
- Patients may or may not have immediate improvement in symptoms.
- The steroid and local anesthetic mixture must infiltrate the tenoperisteal junction near the common extensor origin at the lateral humeral epicondyle.
- Patients usually have immediate improvement in symptoms.



### Diagnosis

Patients with medial epicondylitis usually report a gradual onset and increased symptoms, with no particular inciting event. Pain at the medial epicondyle or just distal in the flexor-pronator mass usually occurs during the acceleration phase of throwing, when the FCR and pronator teres are most active. Pain over the flexor-pronator mass is not necessarily specific to medial epicondylitis and further examination of the deep muscles of the forearm should be performed. Pain during resisted pronation is the most sensitive finding for medial epicondylitis (Gabel). It is important to differentiate cubital tunnel syndrome (ulnar nerve compression at the elbow) from medial epicondylitis.<sup>23</sup>

### Treatment

Treatment of medial epicondylitis depends on the age of the patient and his or her particular circumstances.<sup>24</sup> Nonsurgical treatment is usually successful and includes rest, ice, and nonsteroidal anti-inflammatory medication.<sup>25</sup>

Steroid injections provide good short-term results (Figure 4), but significant long-term improvements have not been documented compared with conservative treatments alone. Surgical treatment is reserved for patients who do not show significant improvement with rest and a supervised course of prolonged rehabilitation; a period of 6 to 12 months has been recommended.<sup>26</sup> Surgical options include percutaneous epicondylar muscle release,<sup>27</sup> open detachment of the flexor muscle origin without debridement,<sup>28</sup> open detachment of the flexor origin with debridement of pathologic tendinosis tissue followed by secure common flexor repair,<sup>29</sup> open medial epicondylectomy, and open resection of pathologic tendinosis tissue.<sup>30</sup>

**Table 1.** Common Corticosteroid Injection Doses

Medication	Dose
Betamethasone sodium phosphate/ betamethasone acetate	1.5 to 3mg for tendon sheath/small joint
Methylprednisolone acetate	4 to 10mg for tendon sheath/small joint
Triamcinolone acetonide	10mg for tendon sheath/small joint

**Table 2.** Complications/Side Effects of Steroid Injections

Elevated blood glucose levels	Subcutaneous fatty atrophy/necrosis	Depigmentation of the skin
Anaphylaxis	Infection	Tendon/fascial ruptures
Nerve injury	Pain at injection site	

## CONCLUSION

Uncommon types of wrist and forearm tendonitis/tenosynovitis conditions may be misdiagnosed and incorrectly treated. Familiarity with upper extremity tendon anatomy can assist in diagnosis and lead to expedited care either by the primary care provider or by referral to a hand surgeon. Most conservative treatments are effective and include hand therapy, bracing/splinting, and corticosteroid injections. Patients should be warned about the side effects of a corticosteroid injection prior to the injection.<sup>31</sup>

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## Disclosures

None

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