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An intraarticular injection to the elbow joint completely relieves pain in stenosing tenosynovitis of the wrist

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Abstract

Stenosing tenosynovitis of the first dorsal compartment of the wrist, de Quervain's disease causes radial wrist pain and disability. Clinically, corticosteroids are most commonly used to treat de Quervain's disease. The injection of triamcinolone into the sheath of both the extensor pollicis brevis and abductor pollicis longus tendon is known to successfully relieve the symptoms of de Quervain's disease. However, depigmentation of the skin and spontaneous rupture of extensor tendons have been frequently reported as side effects of injection of intra-sheath injection of triamcinolone. To bypass undesirous complications of triamcinolone for the treatment of de Quervain's disease, we conducted an intra-articular injection of it into the elbow joint instead of an intra-sheath injection to the wrist. This retrospective study examines the results of 54 outpatients who presented with de Quervain's disease from October 2018 through September 2021 and were treated with a combination of triamcinolone/ lidocaine injection. After single injection of triamcinolone, patients had a considerable pain relief with a dose-dependent manner and experienced an easier wrist mobility than prior to the treatment. With two times of injections, pain relief and movement flexibility were more consolidated. Adverse complications caused by the intra-articular triamcinolone were observed in none. These results indicate that the intra-articular triamcinolone in the elbow joint can provide an acceptable treatment option for de Quervain's disease.

Keywords: De Quervain's Disease; Corticosteroid; Elbow Joint; Pain; Wrist Mobility; Intra-Articular Injection

1. Introduction

De Quervain's disease is a stenosing tenosynovitis of the first dorsal compartment of the wrist. It is thought that thickening of the synovial sheath containing the extensor pollicis brevis (EPB) and abductor pollicis longus tendons leads to irritation of the muscles, causing pain and swelling over the radial side of the wrist [1].

Treatment for de Quervain's disease usually starts with conservative measures like rest, non-steroidal anti-inflammatory drugs, and splinting. Corticosteroid injection of the first dorsal compartment tendon sheath is usually the next step after failure of conservative measures for stenosing tenosynovitis.

An injection is quick, and with proper technique it can provide long-lasting relief of symptoms. Studies report success rates of 62% to 93% with various corticosteroid formulations [2, 3]. Correct technique involves infiltration of corticosteroid into the tendon sheath and into EPB subsheath if present. The risks associated with corticosteroid injection into tendon sheath include thinning of skin due to fat necrosis of subcutaneous tissue, depigmentation of skin in darker skinned individuals around the injection site, and tendon rupture with repeated injections [4-6].

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Triamcinolone and dexamethasone have been shown to significantly decrease cell viability, suppress cell proliferation, and reduce collagen synthesis in cultured human tenocytes [7, 8].

In this study, we investigated whether an intra-articular corticosteroid in the elbow joint proves a therapeutic effect on de Quervain's disease. Injection of triamcinolone into the elbow joint carried out by directing the needle between the capitulum of the lateral epicondyle and the top of head of radius. Adverse effect by the intra-articular triamcinolone was assessed after three months after its final injection to ensure safety.

2. Material and methods

2.1. Subjects

This study comprises a retrospective chart review of patients with de Quervain's disease who presented at Cho Orthopaedic & Oriental Clinic (Seoul, Korea) between October 2018 and September 2021. Patients with de Quervain's disease with symptom duration of more than 6 weeks were included in our study. Exclusion criteria included presence of recent history of severe trauma to the wrist, history of intra-articular injections of glucocorticoids during the past 6 months, and the use of non-steroidal anti-inflammatory drugs for more than 4 days before the injection. Charts were reviewed for gender, age, and occupation as well as whether the patient presented with unilateral or bilateral disease symptoms.

Diagnosis of the disease was determined by tenderness over the first dorsal compartment, pain distributed over the radial side of the wrist, and a positive Finkelstein test. The date of the initial injection, subsequent injections, and the length of time between injections were noted.

Our study was conducted in accordance with the principles of the *Declaration of Helsinki*. Written informed consent was obtained from each patient.

2.2. Therapeutic interventions

All injections were performed by Dr. Tae Hwan Cho using the same technique. Triamcinolone acetonide (TA) was purchased from Shin Poong Pharm (Seoul, Korea) and 2% lidocaine hydrochloride (LH) was from Huons (Seongnam, Korea). Mixtures of 1 ml of TA (40 mg or 20mg) and 1 ml of 2% LH were prepared and infused into the elbow joint located on the same side of affected wrist.

Infusion into the elbow joint was carried out by laying patient supine with elbow supported in pronation at 45 degrees of flexion. Dr. Cho identified gap of joint line above head of radius posteriorly by passively moving elbow into flexion and extension. He inserted needle at midpoint of joint line parallel to top of head of radius, penetrated capsule, and injected 2 ml of TA mixture solution as a bolus. To make certain whether the tip of needle is placed in the accurate interior of the joint capsule, he pulled up a syringe plunger, aspirated joint fluids, checked color of fluids, and finally injected TA mixture to the elbow joint in every injection.

A patient who was given TA mixture was interviewed during initial clinical assessment and subsequent follow-up visits with a questionnaire designed to provide information about the patient’s age, gender, occupation, symptoms, duration of complaints, and the hand and wrist involved. Other information collected includes pain intensity rating on visual analog scale (VAS) and smoothness of wrist mobilization at initial and subsequent follow-up visits, and associated complications observed after TA injection. Injections were performed once for 40 mg TA-treated group or two times for 20 mg TA-treated group with an interval of 2 weeks between injections.

All the patients were tracked against adverse effects cause by TA injection. After 3 months from the last TA injection, patients were interviewed with telephone whether they had recurring pain, tenderness on the wrist joint, and depigmentation on the elbow joint.

2.3. Data collection and analysis

Pain control was the primary treatment outcome evaluated. A pain score was determined using the VAS, where a score of zero meant the patient had no pain and a score of 10 was the worst pain. The patients were asked to indicate their feeling of pain by drawing a vertical line on a 10 cm VAS before and after the injection of TA.

The secondary treatment outcome measure was smoothness of wrist movement. Each patient was asked to report how much they felt discomfort on daily routine activities. These routine activities included doing housework at home, job-working at workplace, and participating in their favorite pursuits for 2 weeks, and were scored from 0 to 2. The score 0 signified for highly uncomfortable, 1 for rarely uncomfortable, and 2 for normal. This resulted in scores of smoothness of wrist movement, in which higher scores indicate smoother movement. All data are expressed as the mean with standard deviation.

Data were analyzed using SPSS (SPSS Inc., Chicago, IL, USA, Version 18.0). To evaluate the changes of VAS and mobility facility before and after the treatment, the paired *t*-tests were applied. Statistical significance was set at $P < 0.05$.

3. Results

This study enrolled 54 patients with unilateral de Quervain's disease. The age of the patients ranged from 21 to 83 years, with a mean of 52.4 ± 15.5 years. The peak age group in incidence was 51–60 years as shown in Fig. 1. The three top occupations of the patients were housewives, chefs, and teachers/students as shown in Fig. 2. Twenty-two patients (40.7%) had it in the left wrist and thirty-two patients (59.3%) in the right wrist. All of 54 patients had both a history of pain located over the radial side of the wrist and a positive Finklestein test on physical examination. On radiographic examination, all the patients did not have any associated finding at the carpometacarpal joint.

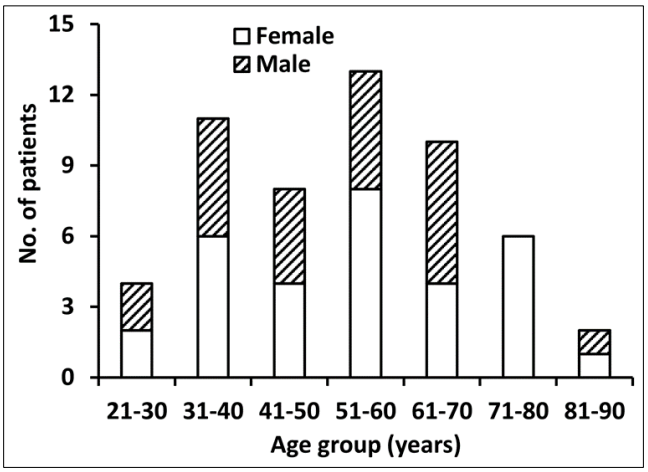


Figure 1 Distribution of the patients by age and gender

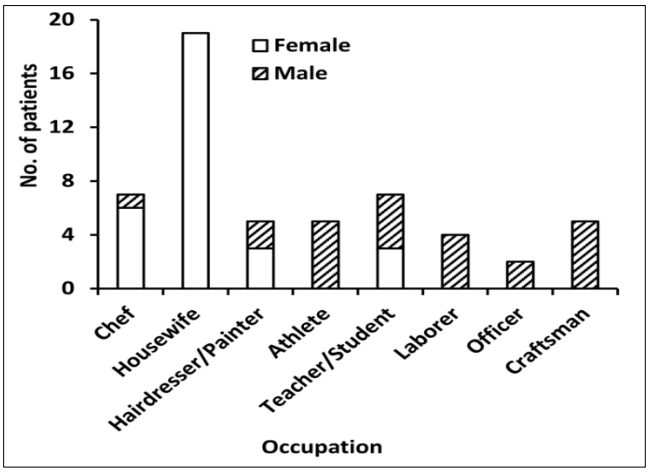
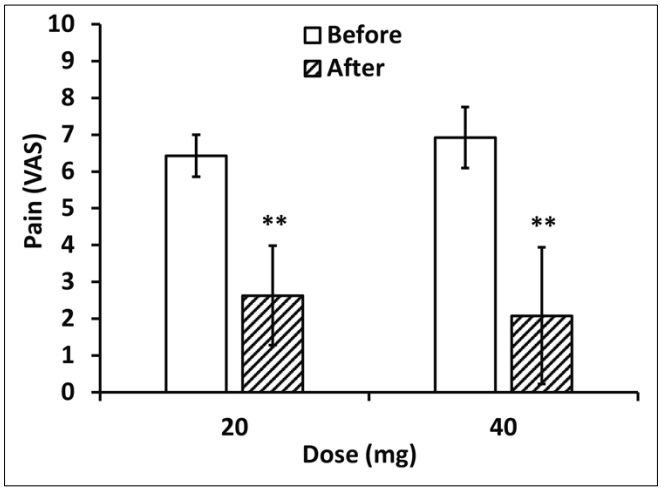


Figure 2 Distribution of the patients by occupation and gender

Twenty-four (44%) patients had one injection of 40 mg TA and thirty (56%) patients got two injections of 20 mg TA with an interval of two weeks. None of the patients suffered postoperative complications.

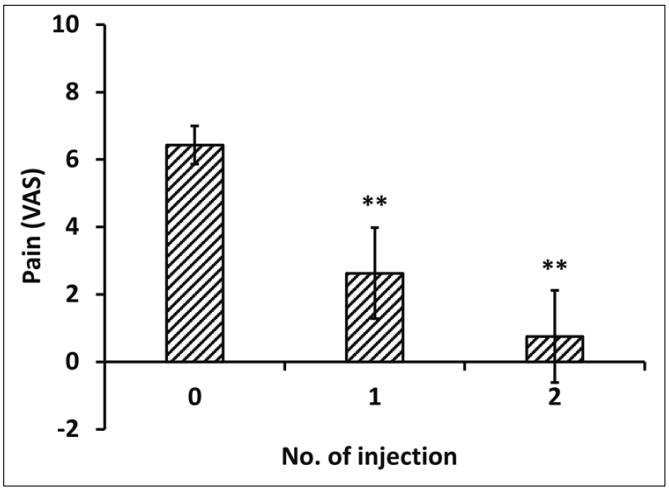
Before injection, pain was aggravated by active or passive thumb motion. On two weeks post injection with 40mg TA to the elbow joint, the pain intensity was ranged from VAS 0 to 6, with a mean of 2.08 from VAS 6.92 (Fig. 3). Patients given 20 mg TA also exhibited decreased pain intensity from VAS 6.43 to VAS 2.63 (Fig. 3). Relative pain intensity after TA injection was 40.9% and 30.1% of the prior-treatment in 20 mg TA-treated and 40 mg TA-treated groups, respectively. A higher decrease in the pain intensity was observed in 40 mg TA-treated group than in 20 mg TA-treated group.



Values on the X-axis show doses of triamcinolone acetonide. Values on the Y-axis represent severity of pain as expressed by VAS. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to before

Figure 3 Pain intensity on VAS of the patients prior to and post intra-articular injection of triamcinolone

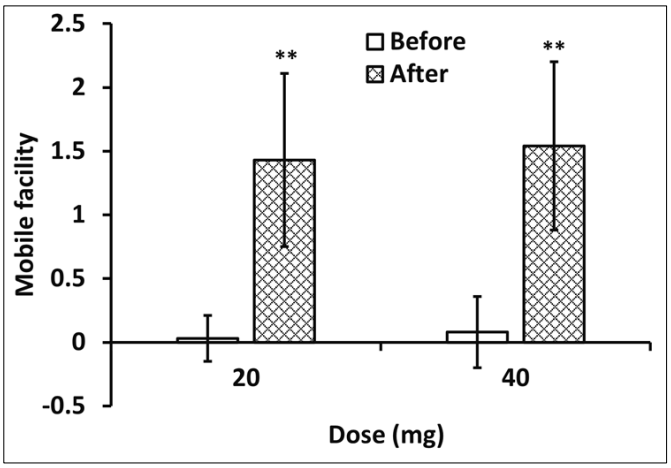
With the second intra-articular injection of 20mg TA to the elbow joint, the pain intensity was further decreased from that of the first injection (Fig. 4). Pain was remained by 33% and 12%, respectively after the first and the second injection of 20 mg TA with compared to prior to the treatment.



Values on the X-axis show treatment numbers of 20 mg triamcinolone acetonide. Values on the Y-axis represent severity of pain as expressed by VAS. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to 0

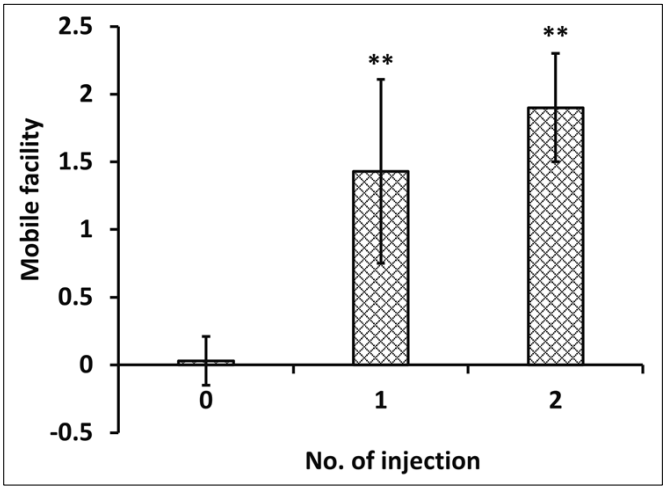
Figure 4 Pain intensity on VAS of the patients by successive intra-articular injection of triamcinolone

At first, most patients adopted in this study complained difficulty in doing works such as twisting cloths, grabbing instruments, lifting things, writing with utensils, cutting with knives, etc. due to wrist pain. Contents of complaints tell patients got de Quervain's disease by their excessive wristy activities. As shown in Fig. 2, occupations of patients with de Quervain's disease included housewives, chefs, teachers/students, hairdressers/painters, atheletes, laborers, officers, and craftsman implying overuse is the major cause of illness. Two weeks post injection of TA, smoothness of wrist mobilization was increased from 0 (highly uncomfortable state) to 1.43 and 1.54 in 20 mg TA-treated and 40 mg TA-treated group, respectively (Fig. 5). With an additional infusion of 20 mg TA, wrist movement was more facilitated than that of the first injection (Fig. 6).



Values on the X-axis show doses of triamcinolone acetonide. Values on the Y-axis represent smoothness of wrist mobilization as scored from 0 to 2. The score 0 signifies for highly uncomfortable, 1 for rarely uncomfortable, and 2 for normal. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to before

Figure 5 Smoothness of wrist mobilization of the patients prior to and post intra-articular injection of triamcinolone



Values on the X-axis show treatment numbers of 20 mg triamcinolone acetonide. Values on the Y-axis represent smoothness of wrist mobilization as scored from 0 to 2. The score 0 signifies for highly uncomfortable, 1 for rarely uncomfortable, and 2 for normal. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to 0

Figure 6 Smoothness of wrist mobilization of the patients by successive intra-articular injection of triamcinolone

4. Discussion

Injection of corticosteroids is most commonly used to treat de Quervain's disease among nonoperative treatments. Corticosteroid injections are not completely benign, and adverse reactions can occur.

Hypopigmentation and skin atrophy are known possible adverse effects of corticosteroids when applied topically or injected locally [9]. A number of case reports measured the onset of depigmentation was approximately 2 months after injection of corticosteroids, and pigment began to return at 6 months [10, 11]. Corticosteroids might lead to a decrease in the number of melanocytes or alter melanocyte function via cytokine or prostaglandin inhibition [12].

Repeated injections of large doses of corticosteroids in an older woman with de Quervain's disease have been shown to cause the spontaneous rupture of multiple extensor tendons [6]. One week after a single dose of corticosteroids, both intact and injured rat rotator cuff tendons were significantly weakened [13]. Suppressed human tenocyte cellular activity and reduced collagen production might lead to disturbed tendon structure and predispose the tendon to subsequent spontaneous rupture [7, 8].

Besides, Stepan et al. [14] reported that type I diabetics and insulin-dependent diabetics experienced elevated blood glucose levels for 2 days following an injection. Goldfarb et al. [15] determined in a double-blind randomized study that 33% of patients experienced a flare reaction during extra-articular injections for trigger digits and de Quervain's tenosynovitis.

Intra-articular corticosteroids are almost beneficial than any other mode of local administration of steroids in that it does not evoke distinct adverse effects. However, effects are almost always only palliative and temporary. Since intra-articular cortisone or hydrocortisone is rapidly hydrolyzed by joint enzymes, it is reasonable to use corticosteroid with long side chains to lengthen its half-life in the body. TA is therefore considered more effective in treating chronic inflammation, such as de Quervain's disease, than soluble steroids. If TA is injected as a suspension, breakdown is impeded and activity lasts longer than any other soluble corticosteroid.

In our study, the effect of TA was verified to relieve pain and ease wrist mobilization. There was no observed skin depigmentation when enrolled patients were tracked after 3 months from the last injection of TA.

Despite a definite decrease of pain intensity and facilitation of wrist mobilization, we find a difficulty in presenting a discrete outline of therapeutic mechanism of TA in the elbow joint towards de Quervain's disease. Over a period of time after injury or overuse, pain develops and fluctuates in intensity. This type of pain alters nerves to be irritated and causes pertinent neural elements and tissues to become increasingly sensitive. It was declared by Hilton that inflammation of joint affects all of its structures including skin, muscles, and nerves [16]. It is derivable that an intervention on a member of sharers of a given nerve may modulate inflammatory reactions of others among common shares. The radial nerve which distributes surrounding the elbow joint runs down the forearm muscles and splits into branches over the wrist. The superficial radial nerve supplies sensation to the radial aspect of the forearm and wrist, with the anterior terminal branch passing almost directly over the first dorsal compartment and providing sensation to the dorsum of the thumb [17]. The intra-articular TA in the elbow joint might soak the neural terminals around the elbow joint, influence neural transmission, and affect muscles of forearm and the wrist joint. It seems that TA in the elbow joint mediates the radial nerves which are shared by the wrist joint to alleviate pain of the wrist.

Due to the severity of side effects of corticosteroid injections, clinicians must weigh the benefits versus risks before relying on this treatment modality. In case of repetitive recurrence of de Quervain's disease in working people, injection into the elbow joint might be a safe alternative to relieve pain without an occurrence of embarrassing adverse effects of TA.

5. Conclusion

This study comprises a retrospective chart review of patients with de Quervain's disease. After intra-articular injection of triamcinolone to the elbow joint, patients had a considerable pain relief dose-dependently and experienced increased pain relief with consecutive injections. Complications were observed in none. These results indicate that in most patients with stenosing tenosynovitis of the first dorsal compartment of the wrist, treatment with a steroid/lidocaine injection intra-articularly to the elbow joint can provide a successful relief of symptoms.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

Hereby, all the authors declare no conflict of interest.

Statement of informed consent

Written informed consent was obtained from all individual participants included in the study.

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