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(RESEARCH ARTICLE)

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An intra-articular injection provides a safe and effective remedy for lateral epicondylitis

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Abstract

Background: Lateral epicondylitis (LE) is an overuse injury affecting people performing repetitive forearm movements. The intra-tendinous injection of triamcinolone has successfully relieved the symptoms of LE but some side effects have been frequently reported. The aim of the study was to investigate whether an intra-articular triamcinolone injection is effective in pain relief and functional improvement in LE.

Methods and results: This retrospective study examined the results of fifty-three patients who presented with LE from July 2020 to December 2021, with an average age of 54 and having a symptom duration of more than 3 months. Mixtures of 1 ml (30 mg) of triamcinolone and 1 ml of 2% lidocaine were prepared and infused into the elbow joint. Two weeks after the treatment, there was a down-gradation in pain and up-gradation in functional ability.

Conclusion: Intra-articular triamcinolone injection was proved to be effective in pain reduction and LE-related functional disability. Complications were observed in none.

Keywords: Lateral epicondylitis; Triamcinolone injection; Intra-tendinous; Intra-articular; Pain; Functional disability

1. Introduction

Lateral epicondylitis (LE), commonly known as tennis elbow, is a musculoskeletal disorder characterized by pain over the lateral humeral epicondyle. It is frequently provoked by activities involving gripping or manual tasks that require manipulation of the hand. Management of LE can vary from 'wait and see' approach to many different forms of interventional therapies including injection and surgery.

An injectable interventional therapy is expected to have less invasive and more satisfactory clinical outcomes for symptom resolution as well as functional improvement than surgical intervention in LE. Corticosteroid is most frequently used and achieves the mainstay injectable modality for LE. Correct technique involves infiltration of corticosteroid into the tendon sheath and systematic reviews disclose corticosteroid injection provides superior short-term benefits for LE [1, 2].

The repetitive use of corticosteroid in tendon sheaths is discouraged due to adverse effects. The literature indicates that, if corticosteroids are placed within tendons, they may evoke a traction injury on the myotendinous junction and predispose the tendon tissue to rupture [3]. Animal experiments prove that intra-tendinous injection causes collagen necrosis [4] and reduces the amount of load that can be taken before failure. Case reports have documented local skin

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hypopigmentation after intra-tendinous or extra-articular injection of corticosteroids in various sites [5, 6]. There is yet no evidence that intra-articular injection is similarly deleterious as intra-tendinous injection [7].

In this study, we adopted an intra-articular injection of triamcinolone for LE therapy instead of intra-tendinous injection. Possible adverse effect by intra-articular triamcinolone was assessed after three months after the injection to ensure safety.

2. Material and methods

2.1. Subjects

This study comprises a retrospective chart review of patients with LE who presented at Cho Orthopaedic & Oriental Clinic (Seoul, Korea) between July 2020 and December 2021. Diagnosis of the disease was determined by pain and tenderness over the lateral epicondyle of the humerus, and pain on resisted dorsiflexion of the wrist, middle finger, or both.

Exclusion criteria included: prior elbow injection-based therapies within the past three months, other concurrent upper extremity pathology, prior upper extremity surgery, and self-reported bleeding disorders, allergy, or intolerance to study medication.

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 a single physician 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 (30 mg) and 1 ml of 2% LH were prepared and infused into the elbow joint.

Patients were lying in supine position with elbow supported in pronation at 45 degrees of flexion. A doctor 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 into the elbow joint on every injection.

Patients were interviewed at initial clinical assessment with a questionnaire designed to provide information about the patient's age, gender, occupation, symptoms, duration of complaints, and the elbow involved. Pain intensity and functional disability of activities were collected before and after the TA injection.

All the patients were tracked against adverse effects caused by TA injection. After 3 months from the TA injection, patients were interviewed with telephone whether they had recurring pain, tenderness, 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 visual analogue scale (VAS), where a score of zero meant the patient had no pain and a score of ten 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 measured was the amount of difficulty in performing activities involving elbow movement. Each patient was asked to report how much they felt difficulty in doing specific activities such as turning a doorknob, carrying a food-bag, lifting a cup filled with water, opening a jar, pulling up pants, and wringing out a wet towel. Usual activities including personal activities (dressing, washing), household work (cleaning, maintenance), work (your job or everyday work), and recreational or sporting activities were also rated for each patient. The scores ranged from zero to ten, where a score of zero signified for no difficulty and a score of ten meant too much difficulty to do activities. Collated scores among each specific and usual activity implied for functional disability of specific and usual

activities in which higher scores indicate more disabled performances. 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 functional disability before and after the treatment, the paired t-tests were applied. Statistical significance was set at $P < 0.05$.

3. Results

This study enrolled 53 patients, 20 males and 33 females, with LE. The ages of the patients ranged from 29 to 71 years, with a mean of 54.2 ± 9.7 years. Patients aged between 55 and 64 years constitute the highest proportion of LE treated in this study (Fig. 1a). Their occupations usually require manual tasks with strenuous or repetitive forearm movement (Fig. 1b).

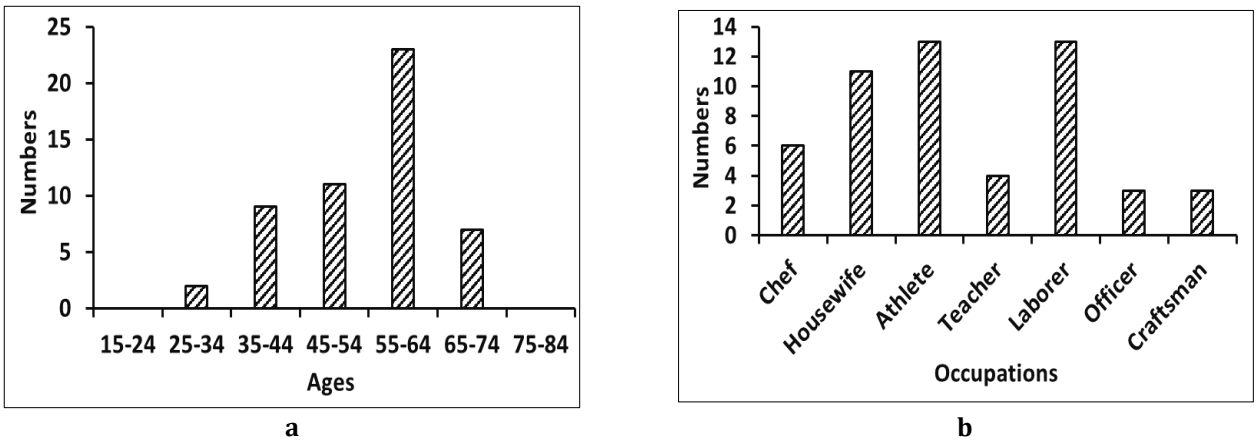
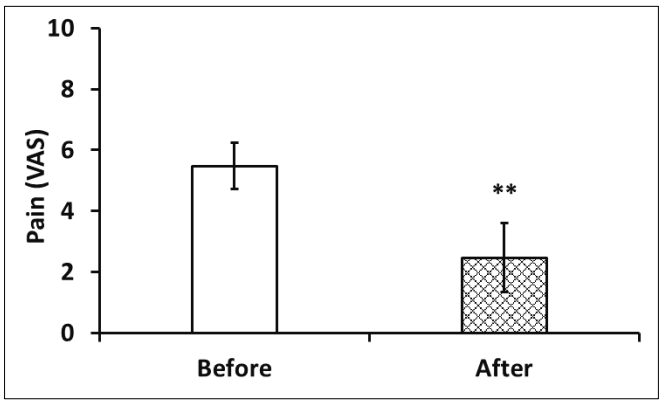


Figure 1 Distribution of the patients by ages (a) and occupations (b)

Twenty-four patients (45%) had LE in the left elbow and twenty-seven patients (51%) had it in the right elbow. Two patients had LE in both sides. All of 53 patients had both a history of pain located over the lateral side of the humerus and obtained positive signs by Maudsley's test in physical examination. The average duration of a typical episode is about three months to one year. On radiographic examination, all the patients did not have any associated finding at the humeroradial joint.

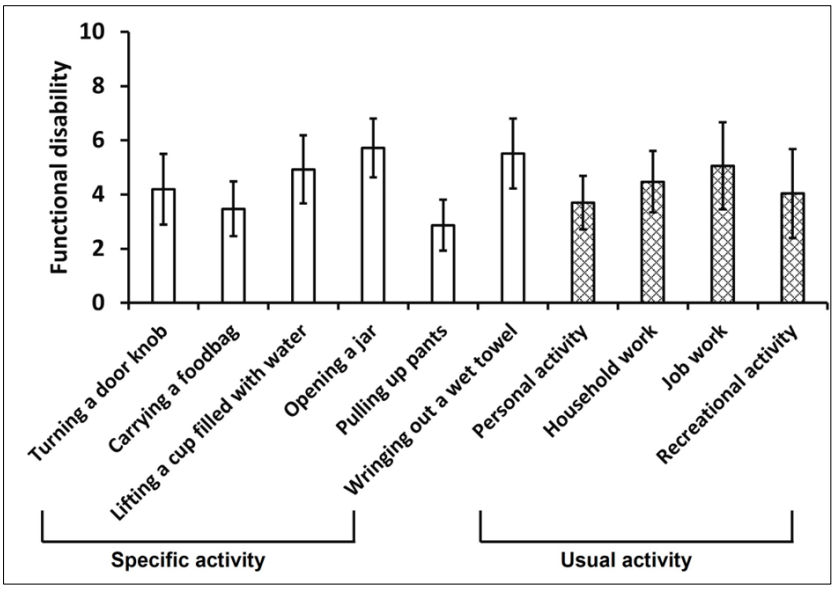


Values on the Y-axis represent severity of pain as expressed by VAS. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to before.

Figure 2 Pain intensity of the patients before and after the intra-articular injection of triamcinolone

Symptoms of patients mainly consisted of pain around the bony prominence of the lateral epicondyle of the elbow that radiates along the forearm within the area of the common extensor mass. Before injection, pain was felt at rest and exacerbated with contraction of forearm extensors. The baseline pain intensity was calculated as VAS 5.5 (Fig.2). On two weeks post injection with 30mg TA into the elbow joint, the pain intensity was decreased to 2.5 with a range from VAS 0.5 to 6 (Fig. 2).

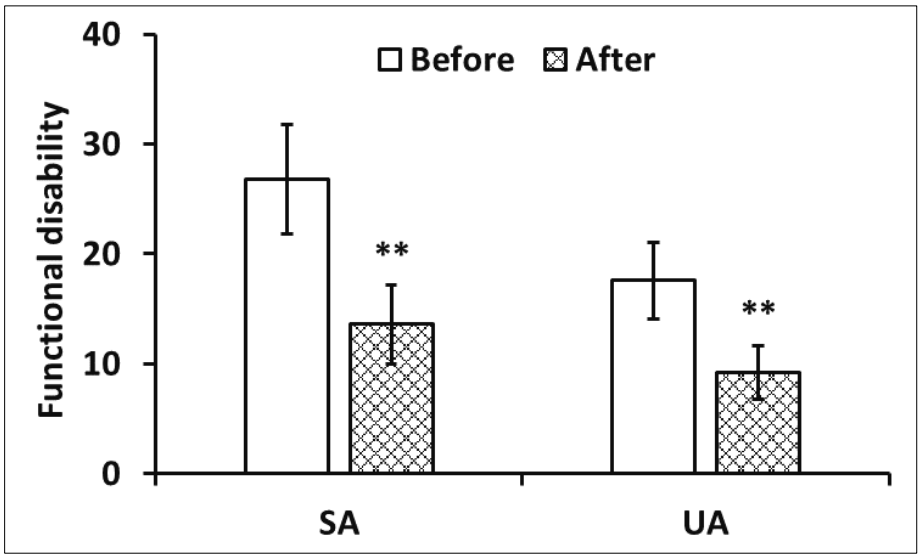
At first, most patients adopted in this study were complained about doing specific activities and usual activities. Difficulties in performing specific activities and usual activities were rated from 2.9 to 5.7 and from 3.7 to 5.5, respectively (Fig. 3). Contents of complaints tell patients got LE by their repetitive activities of forearm extensors contraction.



Values on the Y-axis represent amounts of difficulty in doing activities as scored from 0 to 10. The score 0 signifies for no difficulty and ten represents too much difficulty to do activities. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to before.

Figure 3 Functional disability of specific and usual activities in the patients with LE

Two weeks post injection of TA, functional disability was decreased from 27 (highly uncomfortable state) to 14 in specific activities and from 18 to 9 in usual activities, respectively (Fig. 4).



Values on the Y-axis represent summated scores of each activity. The score 0 signifies for no difficulty and 10 for too much difficulty to do activities in each activity. Bars represent the mean values with standard deviations. ** denotes a statistical significance with $p < 0.01$ compared to before.

Figure 4 Functional disability of specific and usual activities before and after the intra-articular injection of triamcinolone

4. Discussion

There are multiple modalities for treatment of LE, conservative and operative, with varying success. Failure is associated with long duration of symptoms, high baseline pain levels at presentation, manual labor, poor coping mechanisms, involvement of the dominant arm, low socioeconomic status, and concomitant pain in the neck or shoulder [5].

Injection of intra-tendinous corticosteroid is most common among nonoperative treatments for LE. Evidence showed superior short-term pain relief after corticosteroid injections in LE but no conclusive benefit in the long-term [6]. There is evidence that intra-tendinous corticosteroids are not completely benign and adverse reactions can occur.

A case of almost total rupture of the common extensor origin in a 45-year-old female squash player was reported secondary to intra-tendinous injection of corticosteroid [8]. Repeated intra-tendinous 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 [9]. One week after a single dose of corticosteroids, both intact and injured rat rotator cuff tendons were significantly weakened [10]. Suppressed human tenocyte cellular activity and reduced collagen production might lead to disturbed tendon structure and predispose the tendon to subsequent spontaneous rupture [11, 12].

On the other hand, intra-articular corticosteroids seem to evoke no distinct adverse effects. It is reported that the thermographic index, a measure of warmth and hence inflammation, was reduced one week after intra-articular corticosteroid injection [13]. Animal studies have shown intra-articular corticosteroid was protective against development of osteoarthritis [14] and suggested an increase in loss of cartilage proteoglycan [15].

Whereas intra-articular cortisone or hydrocortisone is rapidly hydrolyzed by joint enzymes, intra-articular TA is hindered in its breakdown and maintains its effect longer than any other soluble corticosteroid. As TA is supplied in microcrystalline suspension, its low solubility contributes longer half-life in the body. In our study, intra-articular TA was verified to relieve pain and improve functional disability by easing elbow mobilization. There was no observed skin depigmentation and tendon rupture when enrolled patients were tracked after 3 months from the injection of TA.

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 LE in working people, intra-articular TA 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 lateral epicondylitis. After intra-articular injection of triamcinolone to the elbow joint, patients had a considerable pain relief and function improvement. Complications were observed in none. These results indicate that the intra-articular triamcinolone provides a safe and efficient therapy in lateral epicondylitis.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

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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