Efficacy of Acupuncture versus Local Methylprednisolone Acetate Injection in De Quervain’s Tenosynovitis: A Randomized Controlled Trial

Mohammadjavad Hadianfard 1, Alireza Ashraf 1,2, Maryamsadat Fakheri 1,2,* , Aref Nasiri 1

1 Department of Physical Medicine and Rehabilitation, Shiraz University of Medical Sciences, Shiraz, Iran
2 Burn Research Center, Geriatric Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Available online 6 November 2013

Abstract

There is no consensus on the management of De Quervain’s tenosynovitis, but local corticosteroid injection is considered the mainstay of treatment. However, some patients are reluctant to take steroid injections. This study was performed to compare the efficacy of acupuncture versus corticosteroid injection for the treatment of this disease. Thirty patients were consequently treated in two groups. The acupuncture group received five acupuncture sessions of 30 minutes duration on classic points of LI-5, LU-7, and LU-9 and on ahshi points. The injection group received one methylprednisolone acetate injection in the first dorsal compartment of the wrist. The degree of disability and pain was evaluated by using the Quick Disabilities of the Arm, Shoulder, and Hand (Q-DASH) scale and the Visual Analogue Scale (VAS) at baseline and at 2 weeks and 6 weeks after the start of treatment. The baseline means of the Q-DASH scores were 62.8 and 6.9, respectively. At the last follow-up, the mean Q-DASH scores were 2 versus 9.8 versus 6.2 in the acupuncture and injection groups, respectively, and the mean VAS scores were 2 versus 1.2. We demonstrated short-term improvement of pain and function in both groups. Although the success rate was somewhat higher with corticosteroid injection,
1. Introduction

De Quervain’s tenosynovitis is a stenosing tenosynovitis of the first dorsal compartment of the wrist. It is caused by impaired gliding of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendon sheaths [1]. De Quervain’s tenosynovitis is common among people with jobs that require repetitive hand movements. Pregnant women and lactating mothers have also been reported to be in higher risk due to endocrine influences on fluid retention and/or mechanical stress on the thumb [2–4]. Although the term stenosing tenosynovitis is frequently used and tenosynovitis means the presence of an inflammatory process, histopathological examination of De Quervain’s tenosynovitis indicates that it does not involve inflammation and degenerative changes such as myxoid degeneration, fibrocartilagenous metaplasia, and deposition of mucopolysaccharide, and neovascularization is mostly found [5,6]. Diagnosis is based on history and physical examination. The incidence of De Quervain’s tenosynovitis has been reported to be 0.5% in men and 1.3% in women in the general population. The highest prevalence has also been reported among individuals aged 30–50 years old [7].

Treatment of De Quervain’s tenosynovitis can be conservative or rarely surgical. Conservative managements including rest, early immobilization, strapping, heat, cold, diathermy, transverse friction massage, medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) in the early stages, tendon gliding, and strengthening and eccentric exercises (Eccentric exercise is a special part of isotonic training. Eccentric contractions occur when the muscle-tendon unit lengthens) have most widely been used, but no evidence has been found to support effectiveness of these treatments [1,4,8,9]. Multiple studies have been conducted to evaluate the efficacy of steroid injections. A recent review of articles found positive results of injection compared with other modalities for treatment of De Quervain’s tenosynovitis has been reported to be 0.5% in men and 1.3% in women in the general population. The highest prevalence has also been reported among individuals aged 30–50 years old [7].

Steroid injection remains the most common and effective treatment option for patients with De Quervain’s tenosynovitis. Some of the limitations and failure of injection in treatment of De Quervain’s tenosynovitis have been attributed to inaccurate techniques of injection and anatomic variation in the first dorsal compartment. New techniques have been described to enhance the accuracy of injection such as separate injections over the two tendons or injection under ultrasound guidance [12,13]. The literature review determined that side effects of local corticosteroid injections are relatively mild. However, irritation, change of skin color, skin atrophy, soft tissue calcification, skin defect, hypopigmentation, ecchymosis, and allergic rash were reported [14]. Thus injections have the potential for adverse events, which may make patients indecisive to choose them as a treatment option. These limitations make local steroid injection more challenging to perform. With these realizations, there is an increasing trend for finding new safe modalities for treatment of tendinopathies without emphasis on only anti-inflammatory mechanisms of drugs (NSAIDs or steroids).

Acupuncture for treatment of musculoskeletal disorders is growing in acceptance by both physicians and patients. It is one of the best recognized complementary and alternative medical treatments. Although the classical explanation of acupuncture’s method of action has been a change in the Qi or energy flow of the body, many studies have proposed different mechanisms of action. Local effects include dilatation of blood vessels, distortion of the connective tissue, and changes in regional autonomic activity. The remote endocrine effects consist of release of endorphins and neurologic effects such as alterations on functional magnetic resonance imaging of the brain can also occur. Several pathways of anti-inflammatory actions are also mentioned [15,16].

To the best of our knowledge, no trial study has been done addressing the effectiveness of acupuncture treatments in De Quervain’s tenosynovitis. Therefore, the aim of the present study is to determine the effectiveness of acupuncture on disability and pain in individuals with De Quervain’s tenosynovitis.

2. Materials and methods

This randomized clinical study was carried out at physical medicine and rehabilitation clinics of Shiraz University of Medical Sciences from October 2012 to April 2013. We prospectively followed a consecutive series of 30 patients of any age and either sex with clinical diagnosis of De Quervain’s tenosynovitis. The patients who had symptoms and signs of disease (pain and/or swelling around the styloid process of the radius and positive finkelstein test) were included in the study. All patients underwent routine blood tests and radiography of the wrist. The patients with onset of pain less than 4 weeks, recent history of taking NSAIDs, injection or surgery around the styloid process of the radius, history of direct trauma, fracture of the wrist, uncontrolled concomitant disease (such as diabetes mellitus or coagulopathy), abnormal findings in blood tests or radiography of the wrist, and also pregnant or lactating mothers were excluded from the study. The study was approved by Shiraz University of Medical Science Ethics Committees and registered in the Iranian registry of clinical trials (www.irct.ir) with registration number ID: IRCT2013012012194N1. The acupuncture process adhered to the Standards for Reporting Interventions in Controlled Trials of Acupuncture (STRICTA) criteria [17].

All patients were given a description of the purpose of the study and the plan of treatments, and the participants gave their verbal and written consent. These patients were randomly divided into acupuncture group (n = 15) and injection group (n = 15) using a random allocation software. In the case group (acupuncture), disposable,
sterilized, flexible stainless steel needles (size: 0.25 mm × 40 mm) were used. The needles were inserted into the acupoints LI-5 (Yangxi), LU-7 (Lieque), and LU-9 (Taiyuan). These points were selected based on the meridians contributing to the affected wrist according to traditional Chinese medicine.

Their locations were decided based on World Health Organization (WHO) standards. Yangxi is located on the radial side of the transverse dorsal crease of the wrist, between the tendons of the extensor pollicis longus and extensor pollicis brevis muscle (anatomical snuffbox). Lieque can be found in the small hollow superior to the styloid process of the radial bone, 1.5 cm (1 cm is equal to the breadth of the patient’s thumb) above the distal transverse crease of the wrist. Taiyuan is located at the lateral end of the palmar transverse crease of the wrist, on the radial side (lateral border) of the radial artery and medial to abducted pollicis longus tendon [18,19]. A maximum of four Ahshi points (tender point) was also allowed.

We placed the patients in the supine position to make them more comfortable. The acupuncture group received five treatment sessions, administered within 1 week. At each point, the skin was wiped with alcohol and needles (Ordibehesht Trading. Suzhou Tu’S Acupuncture Medical Appliance Company (China)) were inserted perpendicularly to the depth of 0.5 cm without extrarotational or manual stimulation after needle insertion. The inclination of the needle was 90 degrees in all points. The needles were left in place for approximately 30 minutes. All the acupuncture insertions were performed by a well-trained physiatrist in a similar fashion.

In the control (injection) group, a mixture of 1 mL of (40 mg) methylprednisolone acetate (Iran Hormone Pharmaceutical Company) and 1 mL of 2% lidocaine (Caspian Tamin Pharmaceutical Company) was injected around the APL and EPB tendons sheath. The 25-gauge needle (Avapezesh Company) was inserted 1 cm proximal to the radial styloid process at an angle of 30–45 degrees from the skin and parallel to the direction of the tendons. If paresthesia was experienced, the needle was repositioned to avoid injuring the superficial radial nerve. The injection was performed only once. All the patients were advised to avoid mechanical overload on their hands. The thumb spica splint was prescribed for patients in both groups. We encouraged them not to take analgesic drugs during the course of the study. For cases with bilateral De Quervain’s tenosynovitis, treatment was done for the more symptomatic side.

Treatment for all patients in both groups was performed by one physician. Additionally, the physician had the least possible communication with patients to minimize bias, especially in the acupuncture group. The primary outcome measure was Quick Disabilities of the Arm, Shoulder, and Hand (Q-DASH) questionnaire for evaluation of disability, i.e., a short version of the full DASH. The Q-DASH is an 11-item questionnaire (each question is scored between 1 and 5) designed to measure physical function and symptoms in patients with musculoskeletal disorders of the upper limb. An increase in scores was interpreted as an increase in the severity of functional problems from 0 (no disability) to 100 (complete disability). We used the Persian version of Q-DASH, which has been recently translated and validated for Iranian people [20].

The secondary outcome measure included the 10-cm horizontal Visual Analogue Scale (VAS) for current pain at rest. The scoring system was between 0 and 10 (0 represented no pain and 10 the worst pain comprehensible). Both of these measures were obtained at baseline, 2 weeks, and also 6 weeks after the injection and at the end of acupuncture therapy.

The outcomes were finally assessed according to the percentage of improvement in disability and pain status over baseline in each patient as three terms: nearly complete success of treatment (80% or more improvement), partial success of treatment (60% or more improvement), and failure of treatment (less than 60% improvement) [12]. The Kolmogorov-Smirnov test was used to check the normality of the quantitative outcome variables. The Chi-square test was applied for comparing categorical variables and t test for quantitative variables between the two groups. A repeated-measures analysis of variance (ANOVA) was used to test the changes in VAS and Q-DASH scores within and between the two groups. Values were presented as mean ± standard deviation (SD). All the analyses were carried out using SPSS software, version 15.0 (SPSS Inc., Chicago, IL, USA). A p value < 0.05 was considered statistically significant.

3. Results

A total of 35 patients who fulfilled the inclusion and exclusion criteria agreed to participate in our study and were randomly allocated to either the injection or acupuncture treatment group. Of the 35 patients, three patients in the acupuncture group dropped out due to an inability to take time off work, and two patients in the injection group did not finish the study due to choosing another treatment option. The dropout rate was low for both the injection and acupuncture groups. Fig. 1 illustrates patient enrollment and random allocation of patients to the study groups.

There were no statistically significant differences (p > 0.05) between the two groups in any of the baseline characteristics. Table 1 shows the baseline characteristics of two groups. There were six men and 24 women in this study (80% women). The average age was 40.7 years (range 22–76 years). The right hand was involved in 22 patients, the left dominant hand in two patients, and two were bilateral. The mean duration from the onset of symptoms to the first examination was 5 weeks. The pretreatment mean Q-DASH score of all patients was 62.8 and the mean VAS score was 6.9.

At the last follow-up, the mean Q-DASH score decreased significantly from 61.2 to 6.1 in the injection group and from 64.4 to 9.8 in the acupuncture group (p < 0.001), and the mean score of VAS decreased significantly from 64 to 1.2 in the injection group and from 7.13 to 2.07 in the acupuncture group (p < 0.001).

When outcomes were compared between both groups, the mean Q-DASH score in the acupuncture group was also somewhat higher than the injection group at 2 weeks (24.3 vs. 13.7) and 6 weeks of follow-up (9.8 vs. 6.1) but statistical significance was not demonstrated between the two groups (Table 2).
The mean VAS score in the acupuncture group was slightly higher than that of the injection group at 2 weeks follow-up and differences were statistically significant (3.9 vs. 2.5), but statistical significance was not demonstrated between the two groups at 6 weeks of the follow-up (2 vs. 1.2; Table 3).

At the last follow-up in the acupuncture group, 73% of the patients had partial success of treatment, 53% had nearly complete success of treatment, and failure was determined in 27% of patients. In the injection group, 87% of the patients had partial success of treatment, 80% had nearly complete success of treatment, and failure was detected in 13% of patients (Table 4).

Although superiority of injection in improvement of symptoms over acupuncture was revealed, a significant difference from baseline to follow-ups (at 2 weeks and 6 weeks) was observed in both injection and acupuncture groups ($p < 0.001$). Acupuncture decreased VAS and Q-DASH scores over time, somewhat similar to corticosteroid injection treatment (Figs. 2 and 3).

4. Discussion

De Quervain’s tenosynovitis often becomes chronic because most patients frequently use their hands in daily activities, which make the healing time prolonged. By contrast, the nature of the pain mechanism remains unclear and makes selection of the type of management more challenging [21]. Despite the lack of evidence regarding the effectiveness of any specific treatment for De Quervain’s tenosynovitis, relevant published data showed that injection with 83% cure rate was the most effective management for this condition [10,22]. Our results, similar to previous clinical

### Table 1 Baseline clinical and demographic characteristics of patients with De Quervain’s tenosynovitis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Injection (n = 15)</th>
<th>Acupuncture (n = 15)</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>11 (73.3)</td>
<td>13 (86.7)</td>
<td>0.65</td>
</tr>
<tr>
<td>Age (y)</td>
<td>39.47 ± 12.10</td>
<td>41.93 ± 10.20</td>
<td>0.55</td>
</tr>
<tr>
<td>Right wrist</td>
<td>13 (86.7)</td>
<td>10 (66.7)</td>
<td>0.39</td>
</tr>
<tr>
<td>Pain duration (wk)</td>
<td>4.41 ± 2.91</td>
<td>5.74 ± 3.46</td>
<td>0.26</td>
</tr>
<tr>
<td>Mean Q-DASH score</td>
<td>61.2 ± 15.72</td>
<td>64.4 ± 15.06</td>
<td>0.15</td>
</tr>
<tr>
<td>Mean VAS score</td>
<td>6.67 ± 1.75</td>
<td>7.13 ± 1.55</td>
<td>0.79</td>
</tr>
</tbody>
</table>

The values are mean ± standard deviation (SD) or n (%). Q-DASH = Quick Disabilities of the Arm, Shoulder, and Hand; VAS = Visual Analogue Scale.

### Table 2 Comparison of functional status (Q-DASH score) between acupuncture and injection groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Q-DASH baseline</th>
<th>Q-DASH 2 weeks</th>
<th>Q-DASH 6 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection</td>
<td>61.2 ± 15.72</td>
<td>13.7 ± 9.38</td>
<td>6.1 ± 8.52</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>64.4 ± 15.06</td>
<td>24.3 ± 12.65</td>
<td>9.8 ± 9.93</td>
</tr>
<tr>
<td>Mean</td>
<td>–3.22</td>
<td>–13.77</td>
<td>–2.76</td>
</tr>
<tr>
<td>(95% CI)</td>
<td>(–14.74, –8.29)</td>
<td>(–32.98, –18.81)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.183</td>
<td>0.083</td>
<td>0.227</td>
</tr>
</tbody>
</table>

The values are mean ± standard deviation (SD). CI = confidence interval; Q-DASH = Quick disability of the arm, shoulder and hand.
Acupuncture versus injection in De Quervain’s tenosynovitis. The only side effect of the injection was transient pain, which usually lessened or resolved in about 2 days.

Although injection has been considered the mainstay of management for tendinopathy, the exact mechanism of its therapeutic effect is unknown. Furthermore, a number of studies have provided strong evidence that corticosteroid injection is beneficial in the short term but may be worse than other conservative interventions in the intermediate and long terms [23,24].

According to this study, acupuncture improved not only pain intensity, but also disability status of the patients with De Quervain’s tenosynovitis. Although we noted a higher improvement rate in patient’s symptoms in the injection group, the difference between the two groups was small when the overall effects were evaluated over time and, therefore, the efficacy of acupuncture is likewise remarkable.

To the best of our knowledge, there is no study comparing acupuncture with standard or sham therapy in patients suffering from De Quervain’s tenosynovitis. Our conclusion in this study is supported by the findings of some previous studies looking at the effect of acupuncture on tendinopathies. A review by Pfefer et al [25] showed short-term analgesia from acupuncture in the management of tendinopathy, but could not provide enough evidence to support or reject the use of acupuncture treatment. Recent reviews conducted by Trinh et al [26] and Green et al [27] provided strong evidence suggesting that acupuncture is effective in the short-term relief of lateral epicondyle pain. Another recent study showed that acupuncture improved pain and activity in patients with chronic Achilles tendinopathy compared with eccentric exercises [28].

Recently, several studies proposed a new mechanism for local analgesic effects of acupuncture by the action through A1 (adenosine) receptors at the target tissue [29]. Acupuncture has shown the potential to increase local blood flow within a target tissue and affect fibroblast

<p>| Table 3 | Comparison of pain intensity (VAS score) between acupuncture and injection groups. |
|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Group</th>
<th>VAS baseline</th>
<th>VAS 2 weeks</th>
<th>VAS 6 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection</td>
<td>6.67 ± 1.75</td>
<td>2.53 ± 1.72</td>
<td>1.20 ± 1.61</td>
</tr>
<tr>
<td>Acupuncture</td>
<td>7.13 ± 1.55</td>
<td>3.9 ± 1.75</td>
<td>2.07 ± 2.05</td>
</tr>
<tr>
<td>Mean (95% CI)</td>
<td>−13.22 (−14.47, −39.28, 5.29)</td>
<td>−19.11 (−31.49, 1.05)</td>
<td>−13.99 (−31.49, 3.50)</td>
</tr>
<tr>
<td>p</td>
<td>0.071</td>
<td>0.021</td>
<td>0.129</td>
</tr>
</tbody>
</table>

The values are mean ± standard deviation (SD). CI = confidence interval; VAS = visual analog scale.

<p>| Table 4 | Outcome of treatment in both groups of patients. |
|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>Injection (n = 15)</th>
<th>Acupuncture (n = 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearly complete success</td>
<td>12 (80)</td>
<td>8 (53)</td>
</tr>
<tr>
<td>Partial success</td>
<td>13 (87)</td>
<td>11 (73)</td>
</tr>
<tr>
<td>Failure</td>
<td>2 (13)</td>
<td>4 (27)</td>
</tr>
</tbody>
</table>

The values are number (%).
migration through myofascial collagen manipulation, and these two mechanisms appear to be the cornerstone in management of tendinopathies [30,31]. In addition, acupuncture treatment was well tolerated by patients and seems to be a safe modality with minimal side effects [32]. The adverse events of acupuncture in our experience were minimal (like previous studies) and none of the patients required discontinuation of the sessions. Based on our observations, mild pain and bruises rarely occurred at the acupuncture sites and were transient. Also, enhancement of educational and professional standards in acupuncture therapy will maximize security and minimize the risk of adverse events. Although the beneficial effects of acupuncture treatment may be short term, it seems to be a very safe and useful modality particularly in patients who are reluctant to undergo steroid injection or in patients at high risk for side effects of steroid use, such as lactating women or diabetic patients. Acupuncture therapy in this study was not too time-consuming and all sessions were performed consecutively within 1 week.

Another advantage of acupuncture compared with steroid injection is that it can be performed in more sessions in intractable cases or repeated if recurrence occurs, without fear of adverse events. Acupuncture is also a relatively cost-effective therapy among other modalities.

Despite a similar basic concept, differences in selection of acupuncture points (near and or remote points) might have influenced the results and further research is needed to determine this issue. Another area, when interpreting the outcomes from our study, was the efficacy of psychosocial factors, especially in the acupuncture group that remained uncertain.

Another limitation was the nonblinding method of the study and we need further studies to blind both participant and outcome assessor. In this study, we compared acupuncture with the most standard treatment (steroid injection). Because acupuncture is not a proven modality in the treatment of De Quervain’s tenosynovitis, we preferred to prescribe thumb spica splint for patients in both groups. Although no definite evidence has been produced to support the effectiveness of a splint in the treatment of De Quervain’s tenosynovitis [10], it could have had a confounding effect in outcomes assessments.

Unfortunately another limitation of this study was the short-term follow-up time. The 6-week period may not have been enough to build up the full effects of the acupuncture and also definition of the recurrence was not possible.

Despite the limitations, the present trial shows that acupuncture can be considered as an effective, well tolerated, and safe alternative option in the treatment of patients suffering from De Quervain’s tenosynovitis. Now, we need to assess long-term effects of acupuncture in large clinical trials and in comparison with sham interventions and standard treatments.

Disclosure statement

The author affirms there are no conflicts of interest and the author has no financial interest related to the material of this manuscript.

Acknowledgments

The support of this work, which was part of a thesis for a degree of speciality, is gratefully acknowledged from the Vice-Chancellorery of Research and Technology of Shiraz University of Medical Sciences, Shiraz, Iran. The authors would also like to thank Dr Nasrin Shokrpour for editorial assistance.

References


