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Nonsurgical Treatment of De Quervain Tenosynovitis: A Prospective Randomized Trial

Joseph A. Ippolito[1], Spencer Hauser[1], Jay Patel[1], Michael Vosbikian[1], and Irfan Ahmed[1]

Abstract

Background: De Quervain tenosynovitis is commonly seen in patients who perform repetitive wrist ulnar deviation with thumb abduction and extension. Previous studies comparing nonsurgical options have contributed to a lack of consensus about ideal management. This study's purpose was to analyze results in prospectively randomized patients treated with either corticosteroid injection (CSI) alone versus CSI with immobilization. **Methods:** Radial sided wrist pain, first dorsal compartment tenderness, and positive Finkelstein test were used to define De Quervain. Pain score of 4 or higher on a visual analog scale (VAS) was utilized for inclusion. Following exclusion criteria, patients underwent randomization into groups: (1) CSI alone; or (2) CSI with 3 weeks of immobilization. We followed at 3 weeks and 6 months for further evaluation, where resolution of symptoms and improvements in VAS and Disabilities of the Arm, Shoulder, and Hand (DASH) scores were assessed to evaluate treatment success. **Results:** Nine patients with CSI alone and 11 patients with CSI and immobilization were followed. At 6 months in both groups, patients experienced significant improvement in VAS and DASH scores, while 88% of patients with CSI alone and 73% of patients with CSI and immobilization experienced complete resolution of at least 2 out of 3 of their pretreatment symptoms. Between groups, outcomes were comparable except for resolution of radial-sided wrist pain, which was superior in patients with CSI alone (100% vs 64%). **Conclusions:** Immobilization following injection increases costs, may hinder activities of daily living, and did not contribute to improved patient outcomes in this study. Further prospective studies are warranted.

Keywords: corticosteroid injection, de Quervain, thumb spica cast, thumb spica splint

Introduction

De Quervain was originally described as stenosing tenosynovial inflammation of the first dorsal wrist compartment containing the abductor pollicis longus and extensor pollicis brevis (EPB). This condition is typically characterized by radial-sided wrist pain, tenderness to palpation within the first dorsal compartment, and pain elicited by the Finkelstein test.[9] Frequently, symptoms are worsened by repetitive ulnar wrist deviation with repeated thumb extension and abduction.[18] Symptoms may also be hormonally influenced, contributing to the high frequency at which women aged 30 to 50 years suffer from de Quervain.[20] De Quervain is characterized by myxoid and degenerative changes rather than inflammatory processes.[5]

While surgical management of de Quervain has been associated with successful outcomes,[13] patients are traditionally managed initially with conservative treatment.[6,19] Nonsurgical options previously discussed in the literature include corticosteroid injection (CSI), nonsteroidal anti-inflammatory drugs, thumb spica casting, and physical therapy.[7,19] Many of these treatment modalities have been associated with excellent outcomes in relieving pain and regaining functionality of thumb abduction and extension. Previous studies have attempted to identify the ideal conservative treatment for de Quervain tenosynovitis. Several prospective and retrospective studies have found anywhere between 67% and 93% success rate of CSI, which are widely

[1]Rutgers New Jersey Medical School, Newark, USA

Corresponding Author:
Joseph A. Ippolito, Department of Orthopaedics, Rutgers New Jersey Medical School, 140 Bergen Street, Suite D-1610, Newark, NJ 07103, USA.
Email: ippolija@njms.rutgers.edu

considered the most effective conservative monotherapy in management of de Quervain tenosynovitis.[1,6,8,10,12,15,21,23]

Despite successful outcomes with CSI monotherapy, there is a lack of consensus on the role of additional immobilization with thumb spica casting or splinting. Although an early retrospective study found no differences in outcomes of patients treated with CSI alone versus with additional immobilization,[21] a recent prospective study found additional immobilization to improve outcomes significantly more than CSI alone.[14] Due to a paucity of studies analyzing these 2 treatment options, the objective of this study was to conduct a prospective randomized trial comparing CSI alone and CSI with 3 weeks of thumb spica immobilization and evaluate for any differences in clinical outcomes.

Materials and Methods

Prior to initiation of this study, institutional review board (IRB) approval was obtained. From 2014-2016, all patients with symptoms of de Quervain tenosynovitis were identified for possible enrollment. Exclusion criteria were patients younger than 18 years old; those who received CSI within 6 months; those with previous surgery or trauma to ipsilateral hand, wrist, or forearm; those currently taking analgesics; pregnant patients; those with Lidocaine or steroid sensitivity; or those with a lesion or history of infection at treatment site. In addition, patients with a history of rheumatoid arthritis, radiculopathy, or carpal tunnel syndrome were excluded. For inclusion, patients had to demonstrate all of the following: radial-sided wrist pain, first dorsal compartment tenderness, positive Finkelstein test, and pain score greater than or equal to 4 on a visual analog scale (VAS). Following application of inclusion and exclusion criteria, 26 patients were selected for enrollment and randomization into 1 of 2 treatment arms: CSI alone and CSI with 3 weeks of thumb spica immobilization. Following randomization, 6 patients refused to participate, opting for an alternative treatment. Twenty patients were included for comparison and analysis of outcomes (9 patients with CSI alone, 11 with CSI with immobilization).

All patients received 40 mg of methylprednisolone acetate (1 cc) with 2 cc Lidocaine 2%, using a 25-gauge needle in the first dorsal compartment at the point of maximal tenderness. Patients in the CSI with immobilization group received either a fiberglass thumb spica cast or a removable thumb spica splint. Patients with a removable thumb spica splint were instructed to wear the splint at all times, but were allowed to remove to bathe and immediately reapply. Continuing normal daily hygiene was the primary goal of patients who requested a thumb spica splint rather than a thumb spica cast. Patients in both groups were advised to limit their physical activity and rest as much as possible. Specific analgesics were not prescribed. Upon completion of 3 weeks of immobilization, patients were encouraged to move their wrist and fingers, with no formal therapy prescribed.

Demographic information, including age, occupation, and pretreatment VAS and Disabilities of the Arm, Shoulder, and Hand (DASH) scores, were obtained at initiation of the study. Patients were evaluated at 3-week and 6-month follow-up. At each of these time points, patients were evaluated for the resolution of radial wrist pain and tenderness to palpation, presence of a positive Finkelstein test, VAS score, and DASH score. Nonparametric statistical analysis of categorical information was performed using a chi-square test, unless an expected value was less than 5, in which case Fisher exact test was utilized. Odds ratios were generated with computation of confidence intervals utilizing the Baptista-Pike method. Nonparametric analysis of continuous variables was performed using a Mann-Whitney U test. For comparison of pretreatment continuous variables with posttreatment continuous variables, a paired t test was used. All analyses were performed using GraphPad Prism version 7.00 for Mac OS X (GraphPad Software, La Jolla, California, www.graphpad.com). In all tests, significance was set at $P < .05$.

Results

Demographic information was comparable between the CSI and CSI with immobilization groups, including age, occupation, or pretreatment scores (Table 1). At 6 months, patients in both the CSI and CSI with immobilization groups experienced significantly improved VAS scores compared with pretreatment evaluation (CSI: 6.5 ± 0.9 vs 1.3 ± 0.8, $P < .001$, and CSI with immobilization: 6.9 ± 1.5 vs 1.6 ± 1.9, $P < .001$). Similarly, both groups experienced significantly improved DASH scores at 6 months compared with pretreatment evaluation (CSI: 52.1 ± 16.0 vs 9.1 ± 9.3, $P = .001$, and CSI with immobilization: 63.4 ± 12.1 vs 10.3 ± 15.1, $P < .001$). In the CSI and CSI with immobilization group, 88% and 73% of patients experienced resolution of at least 2 of 3 pretreatment symptoms, respectively. There was no significant difference between the 2 groups in this regard ($P = .436$) (Table 2).

At 3 weeks follow-up, outcomes were similar between the 2 groups regarding resolution of radial wrist pain ($P = .343$), resolution of tenderness to palpation ($P = .714$), negative Finkelstein test ($P = .795$), VAS scores ($P = .433$), and DASH scores ($P = .995$). At 6 months follow-up, patients in the CSI group experienced greater resolution of radial wrist pain than patients in the CSI with immobilization group (100% [9/9] vs 63% [7/11]; $P = .043$). Outcomes were comparable between the groups at all other outcomes, including resolution of tenderness to palpation ($P = .202$), negative Finkelstein test ($P = .822$), VAS scores ($P = .797$), and DASH scores ($P = .864$) (Table 2).

Table 1. Demographic Characteristics and Baseline Assessments.

	CSI	CSI + immobilization	*P* value
N	9	11	
Age (mean)	50	42	.525
Occupation			
Forceful	1	4	.319
Less demanding	6	6	.670
Unemployed	2	1	.566
Dominant hand (right/left)	7/2	6/5	
Affected hand (right/left)	4/5	7/4	
VAS pretreatment (mean ± SD)	6.5 ± 0.3	6.9 ± 0.5	.544
QuickDASH pretreatment (mean ± SD)	51 ± 15	64 ± 12	.098

Note. CSI = corticosteroid injection; VAS = visual analog scale; QuickDASH = Quick Disabilities of the Arm, Shoulder and Hand.

Table 2. Outcomes at 3 Weeks and 6 Months Follow-up.

	CSI	CSI + immobilization	*P* value
Outcomes at 3 weeks			
Resolution of radial wrist pain	6/9	5/11	.343
Resolution of tenderness to palpation	5/9	7/11	.714
Negative Finkelstein test	7/9	8/11	.795
Pain intensity (VAS)	2.4 ± 1.9	2.4 ± 1.8	.433
Functional outcome (QuickDASH)	17.4 ± 14.0	19.1 ± 17.2	.995
Outcomes at 6 months			
Resolution of radial wrist pain	**9/9**	7/11	**.043**
Resolution of tenderness to palpation	5/9	9/11	.202
Negative Finkelstein test	7/9	9/11	.822
Pain intensity (VAS)	1.1 ± 0.9	1.4 ± 1.9	.797
Functional outcome (QuickDASH)	8.4 ± 9.4	9.7 ± 14.4	.864

Note. CSI = corticosteroid injection; VAS = visual analog scale; QuickDASH = Quick Disabilities of the Arm, Shoulder and Hand. Bolded values represent statistical significane ($p < 0.05$).

Discussion

The results of this study suggest no added benefit of 3 weeks of immobilization in addition to CSI in the treatment of de Quervain tenosynovitis. Furthermore, results indicate that immobilization may hinder the resolution of radial wrist pain at 6 months. Despite a paucity of data directly comparing these 2 treatment modalities, several studies have evaluated the efficacy of combining CSI and immobilization in the management of de Quervain tenosynovitis.

Weiss et al[21] performed a retrospective evaluation of several nonoperative treatment modalities, including CSI, thumb spica immobilization, and a combined CSI and immobilization group. Patient experienced superior outcomes in both CSI and CSI with immobilization compared to immobilization alone. However, there was no added benefit found with thumb spica immobilization, as outcomes were comparable with the group receiving only CSI. In addition, authors suggested immobilization may add unnecessary financial cost in the care of these patients and recommended CSI alone for nonoperative treatment. Anecdotally, patients in this study who underwent immobilization expressed frustration in performing activities of daily living. Specifically, several patients reported not being able to return to work until their splint or cast was removed. Being unable to return to work was also the rationale for most patients who refused to participate in the immobilization group after randomization.

More recently, a prospective study by Mardani-Kivi et al[14] found that thumb spica cast immobilization significantly improved the results of CSI, with a 93% treatment success rate (as defined by resolution of pain, tenderness, and Finkelstein test) with CSI and immobilization versus 69% in CSI alone. In response to the Mardani-Kivi study, Menendez and Ring[16] suggested the placebo effect of thumb spica casting, encouragement of kinesophobia, and financial compensation for spica casting may have contributed to bias in the results of the study.

In addition, a systematic review by Cavaleri et al[4] found higher rates of success in studies comparing CSI with immobilization versus CSI alone, although a limitation discussed was the differing definitions of treatment success. In our study, we found that 88% of patients with CSI alone and 73%

with CSI and immobilization had resolution of at least 2 of 3 symptoms aforementioned in the Mardani-Kivi et al[14] study. Although the resolution of these symptoms provides important clinical information, their assessment is subjective, highlighting the importance of objective measures of improvement such as VAS and DASH scores. Another difference in this study is that outcomes were statistically compared individually, including each of the 3 symptoms for inclusion, as well as VAS and DASH scores. In all categories at all time points, immobilization did not confer an additional advantage to CSI.

A pooled-literature evaluation by Richie and Briner[19] demonstrated an 83% cure rate with CSI alone, while there was a 61% cure rate with corticosteroids and immobilization. The importance of rest and immobilization in de Quervain may be less than originally theorized, particularly due to myxoid changes rather than inflammatory processes.[5] Menendez et al[17] showed that full-time splint wear versus as-desired splint wear had no effect on disability, grip strength, pain intensity, or patient satisfaction, concluding that strict rest by immobilization is not disease modifying. Our study found results to be comparable in nearly all measured outcomes between treatment groups, as well as a significantly higher prevalence of radial wrist pain in patients who received 3 weeks of immobilization. No patient in our study suffered any of the reported side effects of extra-articular CSIs, which include fat atrophy and other various localize symptoms such as pain, swelling, and bruising.[3] This atrophy along with other skin changes has previously been noted with ultrasound-guided injections for de Quervain tenosynovitis.[22]

There are several limitations to this study. Although this study is prospectively randomized, our sample size of 20 is small in comparison with previous studies comparing CSI and CSI with immobilization. Despite this, outcomes align similarly with large retrospective studies and meta-analyses on this topic. Six patients refused to participate in the study after randomization. It is unknown whether more patients may have refused participation if they were randomized into an unwanted treatment group, and if this may have contributed to unknown bias. Finally, all patients were treated and evaluated by the same surgeon, thus preventing the possibility of blinding evaluators to treatment modality patients underwent. While a single experienced surgeon performed each injection, we did not verify our CSIs with ultrasound technique, nor did we identify the presence of EPB subcompartments or other anatomic variants involving the first extensor compartment, as previous studies have shown improved outcomes with ultrasound guidance in patients with a separate or incomplete EPB subcompartment.[2,11]

In conclusion, 3 weeks of thumb spica immobilization provided no added benefit to pain and functionality at 3 weeks or 6 months follow-up, and may instead increase the cost of care and hinder patient activities of daily living. Corticosteroid injection remains the consensus first-line in conservative management, though further modifications and adjuncts to treatment are not standardized in practice. Further randomized controlled trials with larger sample sizes are warranted to prior to widespread application of these results.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

Research protocol was in accordance with the Helsinki Declaration of 1975, as revised in 2008 (5). Protocol was reviewed and approved by an Institutional Review Board. IRB ID: Pro20140000323 (Approval date: 10/27/2015)

Statement of Informed Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5). Informed consent was obtained from all patients for being included in the study.

Declaration of Conflicting Interests

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ORCID iD

JA Ippolito https://orcid.org/0000-0002-9211-5766

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