Corticosteroid Injection With or Without Thumb Spica Cast for de Quervain Tenosynovitis

Mohsen Mardani-Kivi, MD, Mahmoud Karimi Mobarakeh, MD, Farzaneh Bahrami, MD, Kevyan Hashemi-Motlagh, MD, Khashayar Saheb-Ekhtiari, MD, Niloofar Akhoondzadeh, MD

Purpose To compare the corticosteroid injection (CSI) with or without thumb spica cast (TSC) for de Quervain tendinitis.

Methods In this prospective trial, 67 eligible patients with de Quervain tenosynovitis were randomly assigned into CSI + TSC (33 cases) and CSI (34 cases) groups. All patients received 40 mg of methylprednisolone acetate with 1 cc lidocaine 2% in the first dorsal compartment at the area of maximal point tenderness. The primary outcome was the treatment success rate, and the secondary outcome was the scale and quality of the treatment method using Quick Disabilities of Arm, Shoulder and Hand and visual analog scale scores.

Results The groups had no differences in mean age, sex, and occupation. The visual analog scale and Quick Disabilities of the Arm, Shoulder and Hand scores were similar in both groups before the treatment. The treatment success rate was 93% in the CSI + TSC group and 69% in the CSI group. Although both methods improved the patients' conditions significantly in terms of relieving pain and functional ability, CSI + TSC had a significantly higher treatment success rate.

Conclusions The combined technique of corticosteroid injection and thumb spica casting was better than injection alone in the treatment of de Quervain tenosynovitis in terms of treatment success and functional outcomes. *(J Hand Surg Am. 2014;39(1):37–41.*

Type of study/level of evidence Therapeutic II.

Key words de Quervain tenosynovitis, corticosteroid injection, thumb spica cast, methylprednisolone acetate.

De Quervain, a Swiss surgeon, defined stenosing tenosynovitis at the first dorsal compartment of the wrist in 1895.[1] Later on, the condition was found to represent tendinosis rather than tendinitis owing to lack of evidence of any inflammation in histopathological specimens.[2,3] The lesion usually results from repeated activities with the wrist in ulnar deviation while the thumb is abducted and extended.[4] This may lead to microtears, which may cause collagen disorientation, mucoid changes, and thickening of the extensor retinaculum.[2,3,5,6] The disease typically occurs in women aged 30 to 50 years.[7,8] The diagnosis is often clinical, and the signs and symptoms are pain, tenderness at the first dorsal compartment, and a positive Finkelstein test.[9,10]

The conventional treatments are nonsurgical, including rest, massage, diathermy, casting, oral analgesics, and local steroid injection.[9,11–13] If nonsurgical treatments fail, surgical treatment is recommended.[14] Although the exact mechanism of the effects of corticosteroid injection (CSI) is not understood, it is preferred

From the Orthopedic Research Center, Poursina Hospital, School of Medicine, Guilan University of Medical Sciences, Rash; and the Orthopedic Department, Bahonar Hospital, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran.

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Corresponding author: Farzaneh Bahrami, MD, Orthopedic Research Center, Poursina Hospital, School of Medicine, Guilan University of Medical Sciences, PO Box 4193713191, Rasht, Iran; e-mail: bahramy.f@gmail.com.

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over nonsurgical treatments such as splints, strapping, rest, and massage.[15,16] A Cochrane review of de Quervain tenosynovitis demonstrated that methylprednisolone injection relieves the signs and symptoms of the condition faster than other nonsurgical treatments.[6] Injection, however, may be complicated by postinjection flare, infection, atrophy of subcutaneous fat, local depigmentation, and tendon rupture.[17]

Mehdinasab and colleagues demonstrated that an overall success rate for a thumb spica cast (TSC) + CSI (37 cases) was 87% and for TSC (36 cases) was 36%.[18] However, few studies have compared the efficacy of CSI + TSC versus CSI.[16,19,20] The present study was conducted to examine and compare the efficacy of TSC + CSI versus CSI alone in the treatment of de Quervain tenosynovitis. We hypothesized that success rate and functional outcome of patients with de Quervain tenosynovitis were not similar between CSI + TSC and CSI methods.

METHODS

Following the approval of the vice chancellor of research and ethic committee of the Guilan University of Medical Sciences and Health Services and registration of the study on the Registry of Clinical Trials, we conducted this study on patients with de Quervain tenosynovitis. The criteria for inclusion in the study were pain on the radial side of the wrist, tenderness at the first dorsal compartment, a positive Finkelstein test, and a pain score greater than 6. The patients who were younger than 18 or who had CSI during the previous 6 months, previous surgery, a history of severe trauma, or wrist fracture were excluded from the study, as were those taking analgesics. We also excluded pregnant patients and those with rheumatoid arthritis, findings associated with diseases related to the nervous system (radiculopathy and carpal tunnel syndrome), a history of sensitivity to lidocaine or corticosteroids, and infection or other dermatological lesions at the treatment site. The eligible patients were assigned to either TSC + CSI or CSI groups using a random block sequence (Fig. 1).

The study was conducted in accordance with the ethical standards of Helsinki[21] and Consolidated Standards of Reporting Trials (CONSORT) statement.[22] After briefing the patients about the possible side effects of both treatments, informed consent was obtained prior to enrollment.

With regards to a previous study[18] and a difference in treatment success rates between intervention groups (Mehdinasab and colleague's[18] success rates: 86% for CSI + TSC and 36% for TSC groups), we calculated the sample size for our study with the minimum difference of 50% of success rate between study groups, the power of 90%, and an alpha level of 0.05 using a 2-tailed hypothesis test. To account for probable dropout, we added 30% more to the sample size. The calculation indicated that there should be a minimum of 25 cases in each group. Initially, 86 patients were eligible for the study; 19 chose not to participate. Thus, 67 eligible patients were randomly divided into CSI + TSC (33 patients) or CSI (34 patients) groups (Table 1).

All patients in CSI + TSC and CSI groups received 40 mg of methylprednisolone acetate (1 cc) with 1 cc lidocaine 2% by M.M.-K. using an insulin needle (25 or 27 gauge) in the first dorsal compartment at the point of maximal tenderness. The patients in the CSI + TSC group received a fiberglass TSC as well. The patients in both groups were advised to reduce physical activities and rest as much as possible. No specific analgesics were prescribed. The cast was removed after 3 weeks, and the patients were encouraged to move their wrist and fingers. No formal therapy was prescribed.

All patients were evaluated for primary and secondary outcomes by a well-trained primary care physician at pretreatment, 3 weeks, and 6 months following treatment. The treatment success rate, as the primary outcome, was assessed according to the presence or absence of pain on the radial side of the wrist, tenderness at the first dorsal compartment, and the results of a Finkelstein test. The treatment was considered to be successful when all 3 criteria were negative, and unsuccessful when at least 1 criterion remained positive. For all patients with persistent findings 3 weeks after treatment, the same treatment was performed the second time and a visit 3 weeks subsequently was arranged. Functional outcome and pain intensity, as the secondary outcomes, were assessed using the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) and a visual analog scale (VAS) where 0 indicated no pain and 10 indicated unbearable pain at the time of the visit. Demographic characteristics such as age, sex, dominant and affected hand, and occupational status (unemployed, employed for a minimum of 1 year in an occupation requiring forceful hand work, or an occupation requiring less demanding hand work) were recorded.

The data were summarized using frequency tables and charts. Repeated measure analysis of variance was used for normally distributed variables, and the Mann-Whitney U test was applied for nonparametric

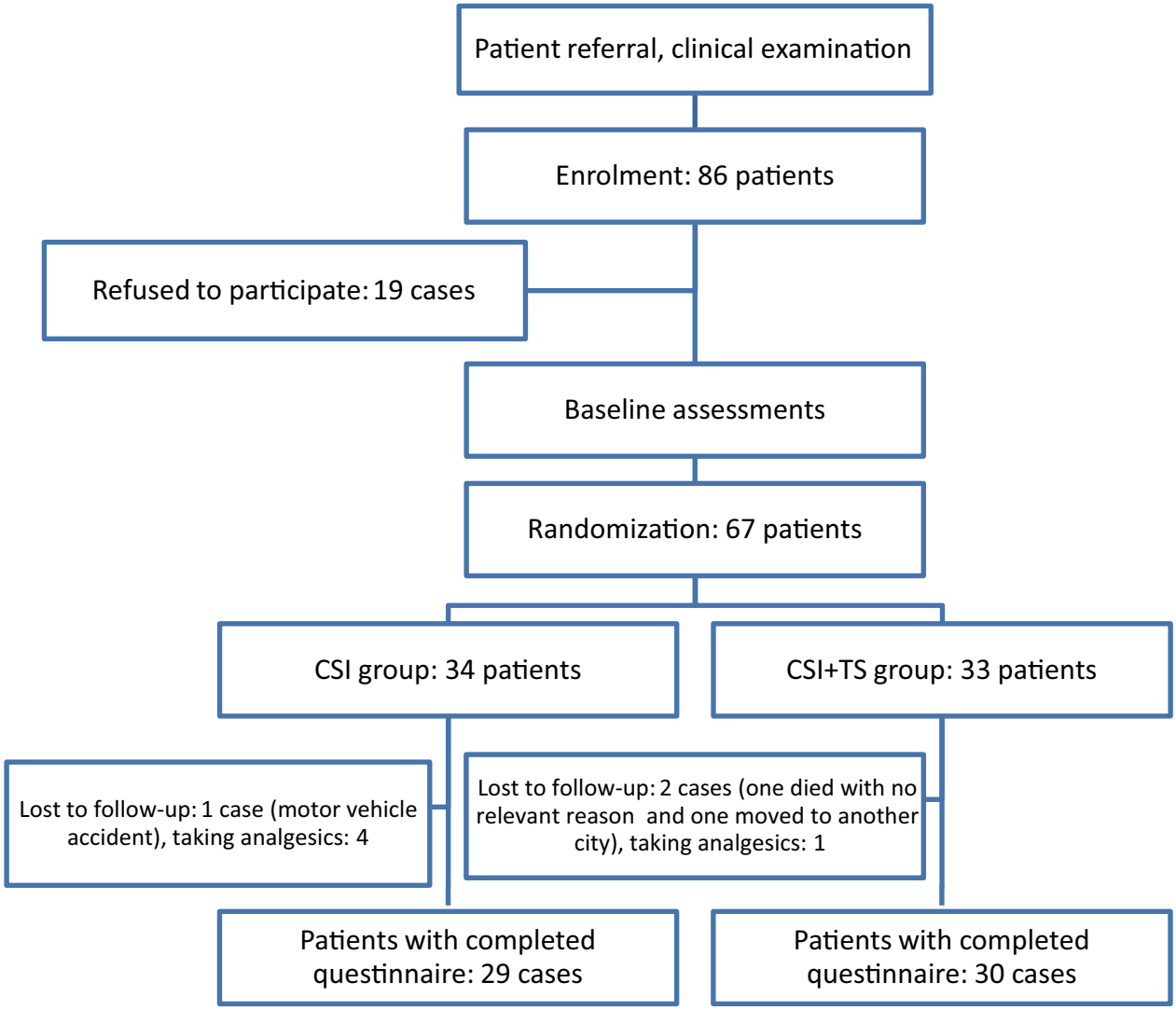

FIGURE 1: Design of the study.

TABLE 1. Demographic Characteristics and Baseline Assessments

		CSI + TSC	CSI	Both Groups	Statistics and Results
N		33	34	67	-
Age (mean ± SD)		42 ± 13	45 ± 12	44 ± 13	NS*
Sex (male/female)		7/23	5/24	12/47	NS†
Occupation (hand work)	Forceful	18	17	35	NS†
	Less demanding	7	9	16	
	Unemployed	5	3	8	
Dominant hand (right/left)		23/7	25/4	48/11	NS†
Affected hand (right/left)		22/7	21/9	43/16	NS†
VAS pretreatment (mean ± SD)		8.8 ± 0.9	8.6 ± 1.1	8.7 ± 1	NS*
QuickDASH pretreatment (mean ± SD)		84 ± 10.4	83 ± 11	84 ± 10	NS*

NS, not significant.
*Independent sample *t* test.
†Chi-square test.

data. According to the results of the Mucheley test of sphericity, the Greenhouse-Geisser correction was used to compare the trends of changes in both groups. For the analysis of variance, Bonferroni correction was applied to detect any significant main effect difference. The chi-square or Fisher exact test was used for categorical variables. P less than .05 was taken as statistically significant.

RESULTS

Both groups were similar with regards to demographic characteristics, dominant hand, affected hand, and occupation status (Table 1). Two patients from the CSI + TSC group (1 died due to unrelated causes and 1 moved to another city) and 1 patient from the CSI group (had a motor vehicle accident) were lost to follow-up before the 3-week post-treatment visit. One patient in the CSI + TSC group and 4 in the CSI group were excluded from the rest of the study because they took analgesics. The intent-to-treat analysis was applied to compare the primary and the secondary outcomes between the CSI + TSC (30 cases) and the CSI (29 cases) groups.

Success rate was significantly better in the CSI + TSC group. At the first follow-up visit, the treatment was successful in 32 out of 33 patients in the CSI + TSC group (97%) and 26 out of 34 patients (76%) in the CSI group ($P = .027$). The treatment was repeated for all the patients with unsuccessful results. All 9 unsuccessful patients in both groups who were treated for the second time were seen 3 weeks later, and all of them had successful results. These 9 patients had successful results at the 6-month follow-up. In the final follow-up visit (6 mo after treatment), the treatment was successful in 28 out of 30 patients in the CSI + TSC group (93%) and 20 out of 29 patients in the CSI group (69%) ($P = .021$). All the patients unresponsive to treatment had both pain and tenderness at the first dorsal compartment.

Both groups were similar regarding to the VAS and QuickDASH scores for the pretreatment visit ($P > .05$). The VAS in the CSI + TSC group was 8.8 ± 0.9 before treatment, 0.21 ± 0.5 3 weeks after treatment, and 0.37 ± 0.4 at the final visit ($P < .001$). The VAS score for the CSI group was 8.6 ± 1.1 before treatment, 1.3 ± 1 3 weeks after treatment, and 1.7 ± 1.5 at the final visit, which were statistically significant ($P < .001$).

The VAS scores changes from the pretreatment visit to the 6-month post-treatment visit were 8.4 ± 1.2 and 6.9 ± 1.9, respectively, suggesting that both treatments were successful in reducing pain. CSI + TSC was, however, significantly more effective in reducing pain ($P < .001$). The VAS scores reduced 96% and 80% in the CSI + TSC and the CSI groups, respectively.

The mean scores of QuickDASH in the pretreatment visit were not significantly different between CSI + TSC and CSI, suggesting the patients in both groups had nearly similar pretreatment function. In the CSI + TSC group, the mean score of QuickDASH was reduced from 84 ± 10 before treatment to 8 ± 8 at 3 weeks follow-up and 10 ± 9 at final follow-up, which were significantly different ($P < .001$). In the CSI group, the mean QuickDASH score decreased from 83 ± 11 before treatment to 17 ± 18 at 3-week follow-up and 19 ± 2 at final follow-up, which were significantly different ($P < .001$). The mean reduction of the QuickDASH score was higher in the CSI + TSC group (74 ± 15) than that of the CSI group (66 ± 18), and the difference was significantly different ($P < .001$). The reduction rates in CSI + TSC and CSI were 87% and 76%, respectively.

The repeated measure analysis of variance test indicated that the reduction rate of VAS and QuickDASH scores were statistically significant in both groups. The differences between the 2 groups were also statistically significant ($P < .001$). In general, the pain relief trend was in favor of the CSI + TSC group rather than the CSI group.

DISCUSSION

The results of this study indicated that the CSI + TSC treatment method was superior to CSI alone with regards to success rate and functional outcomes. The CSI + TSC method was successful in 93% of the patients whereas CSI was successful in 69%. Weiss and colleagues[20] in a prospective study of 93 de Quervain patients, examined the efficacy of the use of CSI, a prefabricated thumb spica orthosis, and simultaneous CSI + thumb spica orthosis methods. They found that the treatment success rate was 67% in patients treated with CSI alone (28 of 42 cases), 57% in patients treated with CSI + orthosis (8 of 14), and 19% in patients treated with an orthosis alone (7 of 37). They recommended the use of CSI alone as an initial treatment. However, the difference between CSI + TSC and CSI methods was not statistically significant, and the patients were not matched according to demographic factors.

Richie and Briner[16] performed a meta-analysis on de Quervain tenosynovitis and reported that the success rates were 83% for CSI, 61% for CSI + thumb

spica orthosis, and 14% for orthosis alone. However, the number of reviewed studies was inadequate for a literature review because only 1 study out of 7 had compared the CSI + TSC and CSI methods and none of the studies were randomized clinical trials.[20] Peters-Veluthamaningal and colleagues,[6] in a Cochrane review, searched databases for randomized and controlled clinical trials assessing the efficacy of CSI in de Quervain tenosynovitis. Among 563 titles they came across only 5 studies of which only 1 study[19] followed the appropriate criteria. Eighteen patients (including pregnant and lactating women, not randomized and not blinded) were assigned into the CSI and orthosis groups, and the results indicated the superiority of CSI over orthosis.[19] They were unable to judge the efficacy of CSI over other treatment methods owing to a limited number of well-designed studies.[6]

One major discrepancy between the results of the present study and those of other studies is that our results indicated that CSI + TSC was superior to CSI. Unlike the study by Weiss and colleagues,[20] we excluded the patients with concurrent medical conditions from our study and randomized the included patients. Although this may improve the homogeneity of the current study group, our results cannot be generalized to those excluded from the study. Another advantage of the present study was that the patients in both groups were similar according to age, sex, and occupation. Thus, the differences between the scores of the CSI + TSC and those of the CSI groups may have been related to the efficacy of the methods rather than interfering factors.

Ilyas[11] reviewed the studies on CSI in the treatment of tenosynovitis and recommended CSI as the treatment of choice and suggested immobilization for the patients with substantial discomfort.

The objective of TSC in the treatment of de Quervain tenosynovitis is to reduce the ulnar deviation and thumb flexion and to rest the involved tendons. [18] One possible explanation for superiority of CSI + TSC over CSI is that TSC immobilizes the thumb and wrist, so the patient is obliged not to stress the abductor pollicis longus and extensor pollicis brevis tendons.

The limitations of the study were the absence of a control group and a blinded design. An increase in sample size would be possible through establishing multicenter enrollment. Owing to lack of adequate, specific, and validated criteria for assessing the functional outcome of the treatment, we had no alternative except to apply VAS and QuickDASH scores. We recommend conducting further clinical trial studies without these limitations and comparing CSI + TSC and CSI alone with different dosages and combinations.

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