

## Corticosteroid Injection with or without Thumb Spica Cast for de Quervain Tenosynovitis

Norman Lamichhane<sup>1</sup>, Sushil Paudel<sup>2</sup>, Binay Lal Shrestha<sup>2</sup>

<sup>1</sup>Department of Orthopedics and Trauma Surgery, Nepal Police Hospital, Kathmandu

<sup>2</sup>Department of Orthopedics and Trauma Surgery, Tribhuvan University Teaching Hospital, Kathmandu

### Correspondence:

Dr. Norman Lamichhane, MS  
Nepal Police Hospital, Kathmandu, Nepal

**Email:** norman3082@gmail.com

Article received: 27<sup>th</sup> April, 2022

Article accepted: 18<sup>th</sup> November, 2022

### ABSTRACT

**Introduction:** de Quervain tenosynovitis is a common condition presenting to Orthopedics Out Patient Department, treatment for which varies widely. The aim of this study was to compare the outcome of treatment with Corticosteroid Injection and Corticosteroid Injection plus Thumb Spica Cast in de Quervain tenosynovitis.

**Materials and Methods:** Seventy-five randomly assigned patients received 40 mg of methylprednisolone acetate with 1 ml of 2% lidocaine and the patients in Corticosteroid Injection and Corticosteroid Injection plus Thumb Spica Cast group received thumb spica cast as well. The primary outcome was assessed using treatment success rate, and the secondary outcome was assessed using Visual Analog Scale and Quick Disabilities of Arm, Shoulder and Hand scores.

**Results:** The treatment success rate was 89.7% in the Corticosteroid Injection and Corticosteroid Injection plus Thumb Spica Cast group and 50% in the Corticosteroid Injection group. Although both methods improved the patients' conditions significantly in terms of relieving pain and functional ability at the final visit, Corticosteroid Injection plus Thumb Spica Cast group showed significant improvement (p value <0.001).

**Conclusion:** 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.

**Keywords:** de Quervain tenosynovitis, methylprednisolone acetate injection, thumb spica cast.

### INTRODUCTION

de Quervain tenosynovitis is stenosing tenosynovitis of the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) within the first extensor compartment of the wrist.<sup>1,2</sup> The repeated activity of the wrist with abducted and extended thumb is the cause of this lesion. The diagnosis is made clinically with pain, tenderness at the first dorsal compartment of the wrist, and a positive Finkelstein test.<sup>3</sup>

The lesion can be managed with both non-operative and operative methods. The non-operative methods

include rest, massage, casting, oral analgesics, and local steroid injection.<sup>2,4,5</sup> Operative intervention is definitive treatment for de Quervain tenosynovitis if all other treatment methods fail.<sup>6,7</sup> The effectiveness of intralesional corticosteroid injection therapy is postulated to be due to anti-inflammatory effects of corticosteroids though exact mechanism of action remains unclear.<sup>2</sup> Minor side effects of steroid injection include temporary pain, skin color changes, subcutaneous fat atrophy, non-tender



Licensed under CC BY 4.0 International License which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

nodules and superficial thrombophlebitis. Serious complications such as tendon ruptures or deep skin infections are rare.<sup>2, 8</sup>

Hand immobilization represents a well-established treatment method in rehabilitation.<sup>9</sup> Addition of cast immobilization to the steroid injection has shown better clinical outcome in various studies.<sup>8</sup>

This study aimed to evaluate and compare the effectiveness of these two modalities of treatment with treatment success rate, Visual Analog Scale (VAS) score and Quick Disabilities of Arm, Shoulder and Hand (Quick DASH) score. Our hypothesis was adding thumb spica cast with corticosteroid injection in de Quervain tenosynovitis has better treatment success rate and functional outcome.

## MATERIALS AND METHODS

A prospective randomized comparative study was conducted in Out Patient Department (OPD), Department of Orthopedics and Trauma Surgery, Tribhuvan University Teaching Hospital, Kathmandu. Research was approved by Institutional Review Board, Institute of Medicine on 27<sup>th</sup> November, 2015 (Reference number: 92(6-11E)2/072/073).

Seventy-five patients who were older than 18 years of age with VAS score of 6 or greater were included in the study and divided into two groups. Patients were randomly assigned to the corticosteroid injection (CSI) group and the corticosteroid with thumb spica cast (CSI+TSC) group, using random envelope. Thirty-nine patients were in CSI+TSC group and thirty-six patients in CSI group. Patients with history of trauma or surgery or previous Corticosteroid Injection to the same wrist, history of inflammatory arthritis and symptom of less than seven days were excluded from the study. Informed consent was taken from all the eligible candidates after fully explaining nature of study. Proforma were filled separately for every participant. 40 mg of methylprednisolone acetate (1ml) with 1 ml of 2% lidocaine using a 25-gauge syringe needle was injected into the first dorsal compartment at the point of maximal tenderness using standard technique for the patients in both groups. The patients in CSI+TSC group received the thumb Spica cast as well, extending from the junction of upper third and lower two third of forearm proximally to proximal

palmer crease and knuckle at the dorsum, and first interphalangeal joint distally. The cast was removed after three weeks and the patients were encouraged to move their wrist and fingers.

All patients were evaluated for primary and secondary outcomes at pretreatment, three weeks and six weeks 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 successful when all three criteria were negative, and unsuccessful when at least one criterion remained positive. Pain intensity and functional outcome, as the secondary outcomes, was assessed using the visual analog scale (VAS) where 0 indicated no pain and 10 indicated unbearable pain at the time of the visit, three weeks and six weeks follow up and Quick Disability of the Arm, Shoulder and Hand Score (Quick DASH Score) at the time of visit and six weeks follow up. Statistical analysis was done using the Statistical Package for Social Sciences (SPSS) version 21.0. Categorical data was analyzed for significance by the Chi square test. Shapiro-Wilk test was carried out to find out normality of the numerical data. Paired t-test was used for normally distributed data and Mann-Whitney U test was used for data that weren't normally distributed.

## RESULTS

Out of 82 cases, three of CSI group dropped out before first follow up and two of CSI group and two of CSI+TSC group dropped out at 2nd follow up (total of seven cases). These cases were excluded from the study.

Out of 75 patients, 39 patients were in CSI+TSC group and 36 patients were in CSI group and available for statistical analysis. The average age of the patients enrolled in the study was 39.04 (SD 12.072) years in CSI group, and 42.82 (SD 12.087) years in CSI+TSC group. Out of 36 patients in CSI group, 10 patients were male and 26 were female and out of 39 patients in CSI+TSC group eight patients were male and 31 were female. Most commonly involved side by de Quervain tenosynovitis was left as a whole and also in both the group. Mean duration of symptoms in CSI group was 58.22 days

as compared to 92.82 days in CSI+TSC group was statistically insignificant.

Treatment was considered successful once patient had no pain, tenderness and a negative Finkelstein test. And, the success rate of treatment was 89.7% in case of patient who received CSI+TSC as treatment compared to 50% in case of patients who received CSI as treatment.

The mean VAS score at presentation, three weeks and six weeks follow up in CSI group was compared to that of CSI+TSC group (independent t-test). It was found that there is no significant difference of VAS score at the time of presentation. However, there was highly significant difference in VAS score at three and six weeks follow up between two modalities of treatment, which indicates that there is significant reduction in pain of the patients receiving CSI+TSC group as compared to CSI group. Similarly, Quick DASH score at presentation and six weeks follow up in CSI group was compared to that of CSI+TSC group. And, it is found that there is no significant difference in Quick DASH score at the time of presentation (independent t-test). But, there was highly significant difference of this score at six weeks follow up (Man- Whitney U test), meaning there by, the treatment with CSI+TSC in de Quervain tenosynovitis has better functional outcome (Table 1).

**Table1: Difference in VAS and Quick DASH score between CSI and CSI+TSC group**

	Modality of treatment	Mean	Standard deviation	p-value
<b>Presented VAS score</b>	CSI	7.03	1.00	.543
	CSI+TSC	7.15	0.78	
<b>Presented Quick DASH score</b>	CSI	74.30	10.98	.628
	CSI+TSC	75.52	9.61	
<b>VAS score (3wks)</b>	CSI	3.22	1.02	<.001
	CSI+TSC	1.67	1.55	
<b>VAS score (6wks)</b>	CSI	2.94	1.35	<.001
	CSI+TSC	0.72	0.99	
<b>Quick DASH score (6wks)</b>	CSI	31.87	14.60	<.001
	CSI+TSC	6.00	9.80	

No major complications were encountered in any

patient during the course of treatment and follow up. Two out of 36 patients in the CSI group had painful swelling on the day of treatment, which were managed with NSAIDs (Non-steroid Anti-inflammatory Drugs) and they responded well to this treatment. Most of the patients in CSI+TSC group had stiffness on the day of cast removal, which wasn't problematic following initiation of mobilization.

**Table2: Comparison of VAS score in two different treatment groups in different studies**

Treatment group		Our study	Mardani-Kivi et al. <sup>(16)</sup>
CSI	Before treatment	7.03±1.00	8.6±1.1
	At 3 weeks	3.22±1.02	1.3±1.0
	At final visit	2.94±1.35	1.7±1.5
CSI+TSC	Before treatment	7.15±0.78	8.8±0.9
	At 3 weeks	1.67±1.55	0.21±0.5
	At final visit	0.72±0.99	0.37±0.4

**Table3: Comparison of Quick DASH score in two different treatment groups in different studies**

Treatment group		Our study	Mardani-Kivi et al. <sup>(16)</sup>
CSI	Before treatment	74.30±10.98	83±11
	At 3 weeks	34.90±10.55	17±18
	At final visit	31.88±14.60	19±2
CSI+TSC	Before treatment	75.55±9.61	84±10
	At 3 weeks		8±8
	At final visit	6.00±9.80	10±9

**DISCUSSION**

The widely advocated non-surgical treatments for de Quervain tenosynovitis like rest, analgesics, splinting and casting alone showed no convincing results.<sup>8,9</sup> At the early years of 20<sup>th</sup> century, surgical release of first dorsal compartment had been widely practiced.<sup>10,11</sup> Many literatures of late 20<sup>th</sup> century and 21<sup>st</sup> century showed successful results with intralesional corticosteroid injection reserving the surgical release only for the failed cases.<sup>2,5,12-15</sup> Hand immobilization in cast as sole method of treatment hasn't shown satisfactory results. But the addition of the thumb spica cast to corticosteroid injection has improved the clinical and functional results.<sup>8,16</sup> Our study showed that the success rate of treatment was 89.7% (35 out of 39 patients) in case of patient

who received CSI+TSC as treatment compared to 50% (18 out of 36 patients) in case of patients who received CSI as treatment. All the differences were significant and similar to other previous studies<sup>8,16</sup>. Weiss et al.<sup>14</sup> found that the treatment success rate was 67% in patients treated with CSI alone (28 of 42 cases), 57% in patients treated with CSI and orthosis (8 of 14), and 19% in patients treated with an orthosis alone (7 of 37). However, the difference between CSI and thumb spica orthosis and CSI methods was not statistically significant, the patients were not matched according to demographic factors and the orthosis use was splint, not cast. 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.

Similar to previous study<sup>16</sup>, our study had significant reduction in VAS score in both groups (p value < 0.001) (Table 2) and, CSI+TSC was significantly more effective in reducing pain (p value < .001). This result suggests that though both treatments were successful in reducing pain, CSI+TSC have better pain reduction than CSI alone. The mean pain rating based on VAS in the patients with CSI+TSC significantly decreased before treatment to follow-up, while this rating in the TSC group also significantly decreased in study by Mehdinasab et al.<sup>8</sup> However, there was significant difference between both groups (p value < 0.001) in terms of pain scores on the VAS and success rate of treatment suggesting that CSI+TSC is more effective form of treatment for de Quervain tenosynovitis.

In our study we found that the mean score of Quick DASH score in both groups was reduced significantly from before treatment to final follow-up (p value < .001) which was similar to the study by Mardani-Kivi et al.<sup>16</sup> (Table 3). The mean reduction of the Quick DASH score was higher in the CSI+TSC group than that of the CSI group, and the difference was significantly different (p value < .001) in both studies. In contrast to this Shah et al.<sup>17</sup>, in their study of 18 patients treated with corticosteroid injection, the average Quick DASH score improved from 78.4 pre-injection to ≤10 post-injection at the end of follow up.

Complications like fat necrosis, subcutaneous atrophy, and skin depigmentation has been reported

in study by Anderson et al.<sup>18</sup>, Neustadt et al.<sup>19</sup>, Sampson et al.<sup>20</sup> and Arons M.S.<sup>21</sup> in 05-10% of cases. In contrast to this, our study had only 2.67% (2 out of 75 cases) of complications and they were steroid flare.

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.<sup>8</sup> One of the 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.<sup>16</sup>

**Limitations of the study:** There was absence of a control group and a blinded design. A larger sample size would be possible through establishing multicenter enrollment. A longer duration of follow up would have given us an idea about long term result with these treatment protocols.

## CONCLUSION

Corticosteroid injection is an effective form of the treatment in de Quervain tenosynovitis in reducing the pain of patient and rehabilitating functionally. Though there is no effective role of thumb spica splints, adding thumb spica cast to the corticosteroid injection significantly improves the effectiveness of treatment without significant increase in financial burden to the patients.

## REFERENCES

1. Clarke M, Lyall H, Grant J, Matthewson M. The histopathology of de Quervain's disease. *Journal of Hand Surgery (British and European Volume)*. 1998;23(6):732-4.
2. Peters-Veluthamaningal C, Winters JC, Groenier KH, Meyboom-deJong B. Randomised controlled trial of local corticosteroid injections for de Quervain's tenosynovitis in general practice. *BMC musculoskeletal disorders*. 2009;10(1):131.
3. Dawson C, Mudgal CS. Staged description of the Finkelstein test. *The Journal of hand surgery*. 2010;35(9):1513-5.
4. Ilyas AM. Nonsurgical treatment for de Quervain's tenosynovitis. *The Journal of hand surgery*. 2009;34(5):928-9.
5. Ilyas AM, Ast M, Schaffer AA, Thoder J. De

- quervain tenosynovitis of the wrist. *Journal of the American Academy of Orthopaedic Surgeons*. 2007;15(12):757-64.
6. Ta KT, Eidelman D, Thomson JG. Patient satisfaction and outcomes of surgery for de Quervain's tenosynovitis. *The Journal of hand surgery*. 1999;24(5):1071-7.
  7. Scheller A, Schuh R, Hönle W, Schuh A. Long-term results of surgical release of de Quervain's stenosing tenosynovitis. *International orthopaedics*. 2009;33(5):1301-3.
  8. Mehdi nasab SA, Alemohammad SA. Methylprednisolone acetate injection plus casting versus casting alone for the treatment of de Quervain's tenosynovitis. *Arch Iran Med*. 2010;13(4):270-4.
  9. Paternostro-Sluga T, Stieger M. Hand splints in rehabilitation. *Critical Reviews™ in Physical and Rehabilitation Medicine*. 2004;16(4).
  10. Finkelstein H. Stenosing tendovaginitis at the radial styloid process. *The Journal of Bone & Joint Surgery*. 1930;12(3):509-40.
  11. Keon-Cohen B. De Quervain's disease. *J Bone Joint Surg Br*. 1951;33(1):96-9.
  12. Richie III CA, Briner WW. Corticosteroid injection for treatment of de Quervain's tenosynovitis: a pooled quantitative literature evaluation. *The Journal of the American Board of Family Practice*. 2003;16(2):102-6.
  13. Sawaizumi T, Nanno M, Ito H. De Quervain's disease: efficacy of intra-sheath triamcinolone injection. *International orthopaedics*. 2007;31(2):265-8.
  14. Weiss A-PC, Akelman E, Tabatabai M. Treatment of de Quervain's disease. *The Journal of hand surgery*. 1994;19(4):595-8.
  15. Moore JS. De Quervain's tenosynovitis: stenosing tenosynovitis of the first dorsal compartment. *Journal of occupational and environmental medicine*. 1997;39(10):990-1002.
  16. Mardani-Kivi M, Mobarakeh MK, Bahrami F, Hashemi-Motlagh K, Saheb-Ekhtiari K, Akhoondzadeh N. Corticosteroid injection with or without thumb spica cast for de Quervain tenosynovitis. *The Journal of hand surgery*. 2014;39(1):37-41.
  17. Shah FA, Khan H, Kifayatullah WA, Khan Z, Durrani ZA, Alam W. Efficacy of local corticosteroid injections in de Quervain's tenosynovitis. *Pak J Surg*. 2012;28(2):118-21.
  18. Anderson BC, Manthey R, Brouns MC. Treatment of De Quervain's tenosynovitis with corticosteroids. A prospective study of the response to local injection. *Arthritis & Rheumatism*. 1991;34(7):793-8.
  19. Neustadt DH. Local corticosteroid injection therapy in soft tissue rheumatic conditions of the hand and wrist. *Arthritis & Rheumatism*. 1991;34(7):923-6.
  20. Sampson S, Wisch D, Badalamente M. Complications of conservative and surgical treatment of de Quervain's disease and trigger fingers. *Hand clinics*. 1994;10(1):73-82.
  21. Arons MS. de Quervain's release in working women: a report of failures, complications, and associated diagnoses. *The Journal of hand surgery*. 1987;12(4):540-4.