

Original Article

Methylprednisolone Acetate Injection Plus Casting Versus Casting Alone for the Treatment of de Quervain's Tenosynovitis

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Abstract:

Background: There is no consensus in the treatment of de Quervain's tenosynovitis, but wrist support with or without local corticosteroid injection has been considered as an effective treatment modality. Some patients have expressed reluctance for steroid injections because of the fear of probable adverse reactions.

This study was performed to compare the outcome of methylprednisolone acetate injection plus thumb spica cast versus cast alone for the treatment of de Quervain's tenosynovitis.

Methods: This randomized prospective study was conducted from January 2005 to July 2008 in the orthopedic clinics of our hospital and private offices. A total of 73 patients with de Quervain's tenosynovitis were managed with either of these methods: 1) injection of methylprednisolone acetate in the first dorsal compartment of the wrist followed by wrist thumb spica cast. 2) casting alone. Wrist casting duration in both groups was one month and the patients were followed for 6 months.

Results: In the first group, a total of 37 patients were included (injection plus wrist immobilization by cast), and 36 patients in the second group (wrist casting alone). The mean age was 32.6 years (21 – 61 years) in all patients. There were 63 women and 10 men. Overall success rate was 86.5% in the first and 36.1% in the second groups, with a significant difference for both groups with respect to pain score and cure rate ($P < 0.05$). Temporary pain was the most common adverse reaction at the site of injection and was noted in 40% of patients. Despite this adverse reaction which was related to methylprednisolone injection, a higher success rate was seen in the injection group in comparison to patients treated solely by casting.

Conclusion: Support of the wrist with casting alone had less favorable outcome in de Quervain's tenosynovitis. Adding methylprednisolone acetate injection into the first dorsal compartment of the wrist is necessary for more optimal results.

Keywords: de Quervain's tenosynovitis, first wrist extensor compartment, methylprednisolone acetate injection, thumb spica cast

Introduction

de Quervain's disease is a common cause of wrist pain which may be quite disabling. It occurs typically in adults 30 to 50 years old, and women are affected six to ten times more frequently than men.¹

This disease was first described by Fritz de Quervain, a Swiss physician who reported five cases in 1895 and eight additional cases in 1912.² The term stenosing tenosynovitis of the first dorsal compartment of the wrist is frequently used for this condi-

tion.^{1,2} This compartment at the radial side of the wrist includes the abductor pollicis longus and extensor pollicis brevis tendons which are affected by inflammation and thickening of their sheath, resulting in impaired gliding of the tendons in the narrow and constricted fibro-osseous compartment.^{3,4} It is caused by overuse and repetitive activities of the wrist in ulnar deviation, thumb in abduction and extension, or may be associated with rheumatoid arthritis or pregnancy.⁵

Conservative treatment, including rest with a splint or cast and injection of a steroid preparation have most widely been used. This approach is most successful within the first six weeks after onset of the disease.^{1,6} There is no consensus on the best protocol for wrist immobilization. Some authors advocate full-time splint or cast application for four to six weeks, with the rationale that tendonitis will resolve with strict rest. We have hypothesized that an

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inflammatory process due to overuse and repetitive irritation of the tendon sheath is present in de Quervain's disease, thus thumb and wrist immobilization in a cast would be effective to reduce this inflammation. A significant improvement, therefore, could be anticipated when methyl prednisolone acetate injection plus casting versus casting alone would be used to treat this disease. Because some patients have a fear of probable steroid side effects and each of these treatment modalities has its advantages and disadvantages, and a few reports are present with regard to casting alone; therefore we carried out this study to compare the outcome of these two treatment methods.

Patients and Methods

This prospective randomized clinical study was carried out from January 2005 to July 2008 at two orthopedic clinics of Imam Khomeini Hospital, Jondishapur University of Medical Sciences, Ahwaz, Iran and private offices. Diagnosis of disease was based on three clinical findings, including: 1) pain at the radial wrist with resisted extension or abduction of the thumb, 2) tenderness at the first dorsal extensor compartment over the styloid process of the radius, and 3) a positive Finkelstein test. Patients with a previous history of acute trauma, wrist fracture, steroid injection, pregnancy, or rheumatoid arthritis were excluded from the study.

Finkelstein's test was performed as the most pathognomonic objective sign in diagnosis of this disease. It was considered positive when passive ulnar deviation of the hand with thumb and fingers in palmar flexed position provoked pain over the styloid tip of the radius.⁷ All patients were given explanations of the nature of the disease and plan of treatment. Written informed consents were given by

all patients. Patients were randomly assigned based upon their admission number. Patients were consequently treated in two groups:

Group 1 patients were given an injection of 1 mL (40 mg) methylprednisolone acetate with a fine gauge (25 or 27) insulin needle at about 2 cm above the styloid process of the radius into the first dorsal compartment of the wrist. Subsequently, a well padded wrist thumb spica cast was applied.

Group 2 patients received casting alone. The patients were similar in both groups with respect to age, sex, duration of symptoms and criteria of diagnosis. Duration of casting was one month and all patients were encouraged not to use any analgesic drugs during that period. Follow-up consisted of physical examination after cast removal, then patients were seen monthly for six months. At each visit, patients were asked about and examined for any residual pain, Finkelstein test and tenderness over the radial styloid.

A total of 80 patients presented with de Quervain's disease; of these, 7 patients (8.7%) were excluded from study because of rejection of the treatment plan (5), rheumatoid arthritis (1), and malunion of an old distal radius fracture (1). Thus a total of 73 patients entered the study. In group 1, 37 patients were treated with methylprednisolone injection plus cast, and 36 patients were only treated with a thumb spica cast (group 2). The mean age of all patients was 31.2 years (range 21 – 61 years). Patients were seen in follow up for six months. There were 9 men and 64 women. The demographic data and characteristics of the patients are given in Table 1.

The outcome was assessed in terms of the three physical signs; including wrist pain, tenderness and Finkelstein test. Treatment was considered successful if all three of these findings resolved and the patient had at least 90% improvement in the pain score. Failure was defined as absence of any one of

Table 1. Patient profiles

Variable	Group 1: Methylprednisolone acetate injection + cast	Group 2: Cast
Number of patients' wrists	37(100%)	36(100%)
Female	32(86.50%)	32(88.9%)
Male	5(18.5%)	4(11.1%)
Age (year)		
Mean \pm standard deviation (SD), (range)	32.83 \pm 8.9(23–59)	29.61 \pm 7.7 (21–61)
Right wrist	22	25
Left wrist	15	11
Duration of disease, weeks		
Mean \pm SD, (range)	5.59 \pm 3.61(2–13 w)	6.45 \pm 3.43(3–14 w)

Table 2. Outcome of treatment in both groups of patients

Variable	MP injection+cast (n=37)		Cast (n=36)	
	n	%	n	%
Success	32	86.5	13	36.1
Failure	5	13.5	23	63.9
Post-injection pain	15	40	—	—

Table 3. Outcome of treatment with respect to pain score (VAS)

Variable: Average pain score (VAS), (0–100 mm)	MP injection+cast	Cast	95% Confidence interval		P-value
	Mean±SD	Mean±SD	Lower	Upper	
Before treatment	97.16±2.31	95.89±3.31	-0.068	2.615	0.065
After treatment					
Success rate	6.70±6.82	17.3±11.34	-14.98	-6.27	<0.001
Failure	33.35±13.17	43.05±12.47	-15.69	-3.71	0.002
Skin hypo-pigmentation	1(2.70%)	—	—	—	—
Sensory radial nerve impairment	1(2.70%)	—	—	—	—
VAS=visual analog score					

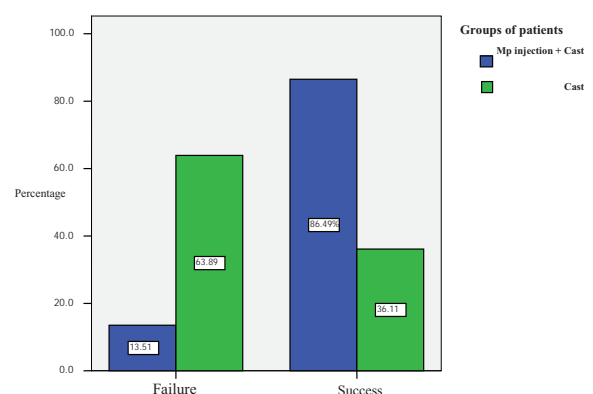
these three findings and/or less than 90% improvement in the pain score. Pain was assessed by a 100 mm visual analog scale (VAS) before treatment and during follow-up, with 0 defined as no pain and 100 as the worst pain. Quantitative values were expressed as mean±SD, and differences between both groups were assessed by unpaired *t*-test and with Chi-square test. Statistical data analysis was performed using SPSS software (version 11). A *P* value of <0.05 was considered significant.

Results

The overall success rate was 86.4% in the injection group and 36% in the cast group. Pain was experienced in 21 wrists which lasted less than one day post-injection.

There were 5 out of the 32 patients treated with methylprednisolone acetate injection who demonstrated recurrence in one or more signs of disease during the follow-up period. The rates of failure in the injection and casting groups were 13.5% and 63.8%, respectively ($P<0.01$; Figure 1). Skin discoloration at the injection site was seen in 1 case which resolved after six months. In one patient sensory radial nerve impairment was noted for 21 weeks after injection. The most common side effect of the

methylprednisolone acetate injection was pain after injection which relieved during the first day in all patients. There was significant difference between both groups ($P<0.001$) in terms of pain scores on the VAS and success rate of treatment (Tables 2 and 3). There was no complication or adverse effect in the casting group. The mean pain rating based on VAS in the patients with methylprednisolone acetate injection plus casting decreased from 97 mm before treatment to 6 mm at the final follow-up ($P<0.001$), while this rating in the cast group decreased from 95mm to 18mm ($P<0.001$).

**Figure 1.** The success and failure rates in both groups of patients

Discussion

Currently the common treatment modalities for de Quervain's disease are non-operative and consist of modification of wrist activities, analgesic drugs, corticosteroid injection, bracing, casting, and physical therapy.⁷ Surgery is reserved only for those with intense chronic pain unresponsive to conservative treatment. This study has revealed that more patients respond favorably to methylprednisolone acetate injection. The effectiveness of corticosteroid therapy is attributed to the inflammatory effects of this drug, but the exact mechanism of action remains unclear.⁸ There are a few reports on the results of treatment of this disease with a single injection plus cast versus cast alone. In a study by Kitti et al. the success rate with steroid injection was 67%.⁸ In a systematic review of effectiveness of corticosteroid injection for de Quervain's tenosynovitis, performed by Richie and Eriner that included seven observational studies with 459 wrists, it was determined that 83% of the 226 wrists which received injection alone were cured, 61% of the 101 wrists that received injection and splint immobilization were cured, and 14% of patients who received splinting alone were cured.¹⁰

Although steroid injection may have some adverse side effects, all are transient as noted in this study. Therefore, before starting treatment, patients should be informed regarding the transient increase in pain and skin side effects of methylprednisolone which may persist for a time after injection.^{11,12} With respect to wrist immobilization, we presume that the inflammation of the tendon sheath resulting from overuse would be relieved by casting, but as we noted, it is the effect of methylprednisolone acetate rather than casting alone that improved the symptoms of de Quervain's disease.

It is possible that repeating the injection at two points of tenderness and longer follow-up time might be associated with a higher success rate. Also injection failure may be due to anatomic variations in the first dorsal compartment, such as a separate synovial compartment or septa containing the extensor pollicis brevis tendon that has been reported in 40 – 90% of wrists treated by surgery.^{13,14}

In the present study we found a high rate of wrist pain after methylprednisolone acetate injection (40%) which was the most common side effect. Although temporary in all patients and relived in the

first day post-injection, the addition of a 1 mL volume of 2% lidocaine with the methylprednisolone acetate injection may help to decrease the incidence of this side effect.

The limitations of our study may be the short-term follow-up time, therefore the recurrence rate was not possible to assess. Thus a future study will be needed. Another limitation was the non-blinding method of the study. We concluded that the injection of methylprednisolone acetate plus a thumb spica cast was more effective than casting alone in the treatment of de Quervain's tenosynovitis. Application of a prefabricate removable thumb holder and wrist splint for a short period of time may be preferred in patients that complain of pain after local steroid injection.

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References

1. Wright PE II. Carpal tunnel, ulnar tunnel, and stenosing tenosynovitis. In: Campbell WC, Canale ST, Beaty JH, eds. *Campbell's Operative Orthopaedics*. 11th ed. Philadelphia, PA: Mosby/Elsevier; 2008: 4299 – 4230.
2. De Quervain F. Ueber eine form von chronischer tendovaginitis. *Cor-Br F. Schweiz aerzte*. 1895; **4**: 899 – 903.
3. Schned ES. De Quervain tenosynovitis in pregnant and postpartum women. *Obstet Gynecol*. 1986; **68**: 411 – 894.
4. Battersen R, Hammond A, Burke F. The de Quervain's screening tool: validity and reliability of a measure to support clinical diagnosis and management. *Musculoskeletal Care*. 2008; **6**: 168 – 180.
5. Weiss AP, Akelman E, Tabatabai M. Treatment of de Quervain's disease. *J Hand Surg Am*. 1994; **19**: 595 – 598.
6. Finkelstein H. Stenosing tendovaginitis at the radial styloid process. *J Bone Joint Surg*. 1930; **12**: 509 – 540.
7. Ilyas AM, Ast M, Schaffer AA. De quervain tenosynovitis of the wrist. *J Am Acad Orthop Surg*. 2007; **15**: 757 – 764.
8. Kitti JI, Sukit S, Kitiwan V, Surut JI. Treatment of

- de Quervain disease with triamcinolone injection with or without nimesulide. *J Bone Joint Surg Am.* 2004; **86**: 2700 – 2706.
9. Richie CA III, Eriner WW Jr. Corticosteroid injection for treatment of de Quervain's tenosynovitis. A pooled quantitative literature evaluation. *J Am Board Fam Pract.* 2003; **16**: 102 – 106.
 10. Anderson BC, Manthey R, Brouns MC. Treatment of De Quervain's tenosynovitis with corticosteroids. A prospective study of the response to local injection. *Arthritis Rheum.* 1991; **34**: 793 – 798.
 11. Goldfarb CA, Gelberman RH, McKeon K, Chia B, Boyer MI. Extra-articular steroid injection: early patient response and the incidence of flare reaction. *J Hand Surg Am.* 2007; **32**: 1513 – 1520.
 12. Witt J, Pess G, Gelberman RH. Treatment of de Quervain tenosynovitis: a prospective study of the results of injection of steroids and immobilization in splint. *J Bone Joint Surg Am.* 1991; **73**: 219 – 222.
 13. Harvey FJ, Harvey PM, Horsley MW. De Quervain's disease: surgical or nonsurgical treatment. *J Hand Surg Am.* 1990; **15**: 83 – 87.
 14. Jackson WT, Viegas SF, Coon TM. Anatomical variation in the first extensor compartment of the wrist: a clinical and anatomical study. *J Bone Joint Surg Am.* 1986; **68**: 923 – 926.