Treatment of de Quervain Tenosynovitis : A Prospective Randomized Controlled Study of Steroid Injection With and Without Immobilization in a Splint

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ABSTRACT

This is a prospective, randomized, controlled study on the treatment of de Quervain tenosynovitis, comparing steroid injection with and without immobilization in a splint. One hundred and forty patients were randomly divided into two groups by block randomization in sizes of four. Group I consisted of patients whose hands were immobilized with a volar wrist splint after steroid injection. Group II consisted of patients whose hands were not immobilized after injection. There were seventy-two and sixty-eight patients in groups I and II, respectively. Most of the patients were female and the mean age was 35 and 33 years of age in Gr. I and II, respectively. Fifty-five and sixty percent of the patients in Gr. I and II had the first episode of this condition. Powers of the thumb abduction before treatment were 6±4 mmHg. and 5±3 mmHg. ($p>0.05$) in Gr. I and II, respectively. The duration of symptoms before treatment was similar in both groups ($p>0.05$). There were 15 and 17 patients lost to follow up in the group I and II, respectively. Fifty-three cases in group I (74%) and fifty-one cases in group II (75%) had satisfactory results. Twenty-eight and thirty-three percent of the follow-up cases had recurrence of symptoms in group I and II, respectively. Twenty cases in Gr. I had complied poorly in wearing the splint. The days lost from work in Gr. I (28±9 days) were more than Gr. II (11±7 days) ($p<0.05$).

Stenosing tenosynovitis was described by de Quervain in 1895. Several nonoperative treatments have been described for de Quervain's stenosing tenosynovitis. These treatments include nonsteroidal anti-inflamatory drugs, splinting, and corticosteroid injection, and may be used alone or in various combinations[1-7]. In addition to the direct cost of the appliance, splinting often interferes with activities of daily living, vocational, and recreational activities. To date, little evidence has been presented in the literature concerning the use of adjunctive in the treatment of de Quervain's stenosing tenosynovitis. This study was designed to compare the clinical efficacy of steroid injection and splinting with steroid injection alone for the treatment of stenosing tenosynovitis of the first dorsal wrist compartment.

MATERIALS AND METHODS

From April 1992 to January 1995, one hundred forty patients were diagnosed by three investigators at Srinagarind University Hospital. All of the patients were fully informed that they would be assigned in a prospective, randomized fashion, to one of two groups : Group I consisting of patients who were immobilized with a volar wrist splint after steroid injection, and Group II consisting of patients who were not immobilized after injection. The patients were included in the study if they had characteristic symptoms and signs of de Quervain stenosing tendinitis, including pain at the lateral aspect of the wrist, maximum point of tenderness at the radial styloid process (over the first compartment), and a positive result on Finkelstein testing[8]. The patients who had histories of previous operative decompressions of de Quervain tenosynovitis, rheumatoid arthritis, or fracture around the wrist joint were excluded from the study. The follow-up periods were at least twelve months. There were seventy-two and sixty-eight patients in groups I and II, respectively. The patients were evaluated not only for clinical responses but also the power and ability of thumb abduction by using the de Quervainometer (Figure I). Patient characteristics are presented in Table I.

The de Quervainometer is an instrument which measures the power and ability of thumb radial abduction while the interphalangeal joint of the thumb is in extension. The wrist joint is supported in the ulnar deviation position, then the patient is asked to abduct the thumb against the balloon

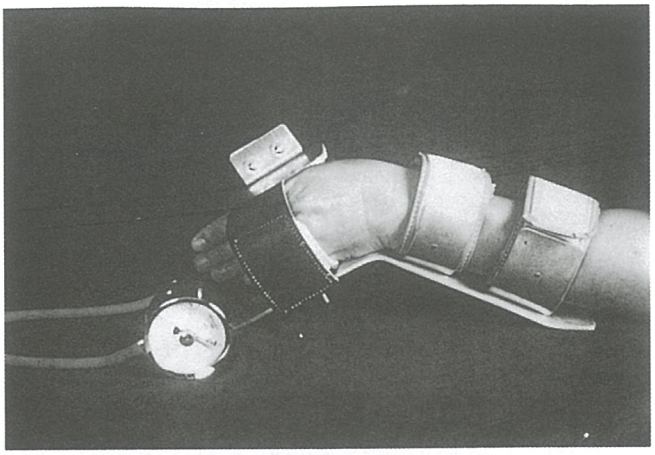

Figure I. The technique for measuring the power of thumb abduction by the de Quervainometer.

pressure sensor to measure the force of thumb abductor and extensor muscles (abductor pollicis longus and extensor pollicis brevis muscles). The force is recorded in millimeter of mercury (mm. Hg). This instrument's reliability was tested before use and it was found to have a high intraclass correlation coefficient (r=0.87).

Treatment consisted of a single injection of one milliliter of a suspension containing forty milligrams of methylprednisolone acetate and one milliliter of 1 per cent solution of lidocaine without adrenaline into the first dorsal compartment through a 22 gauge needle. The technique of injection is as described by Witt et al[7]. A short arm thumb spica splint (included the thumb interphalangeal joint) was used to maintain the wrist in 20 degrees of dorsiflexion and the thumb in extension. Patients were asked to wear the splint for three weeks. The patients were evaluated by the three investigators and the follow up schedule was once every week for three weeks. During the follow-up, the patients were asked about symptoms, repeated physical examinations and measured the abduction forces by the de Quervainometer. If a patient's symptoms and/or signs persisted for three weeks or the patient was lost to follow up, then this patient was considered as a treatment failure case. A patient who wore the splint less than 18 days was recorded as a non-compliant patient. The patients who had satisfactory results were followed every three months for one year to measure the recurrence of symptoms after treatment.

The statistical methods used in this study were the Chi-square test and Fisher exact test. The significant level of alpha was less than 0.05.

RESULTS

There were 72 and 68 patients in groups I and II, respectively. Most of the patients were female and the mean ages were 35 and 33 year of age in Gr. I and II, respectively. Fifty-five percent of the patients in Gr. I and 60 percent in Gr. II had the first episode of this condition. Other characteristics of the patients in both groups were similar (Table I). Twenty-seven percent of the cases had symptoms during their post partum period. Twenty-seven percent of the cases had diabetes mellitus. Powers of the thumb abduction before treatment were 6±4 mmHg. and 5±3 mmHg. (Student t test, $p>0.05$) in Gr. I and II, respectively. The duration of symptoms before treatment was similar in both group (Student t test, $p>0.05$). There were 19 and 17 patients lost to follow up in groups I and II, respectively. Fifty-three cases in group I (74%) and fifty-one cases in group II (75%) had satisfactory results. Three weeks after operation, only 42 of 53 cases in Gr. I (80%) could be followed up to one year. Twenty-eight (15/53) and thirty-three (17/45) percent of the cases had recurrent symptoms in groups I and II, respectively. Most of the recurrent cases were in the second and third episodes of the disease and all were female. The durations of recurrent symptoms after satisfactory results were 45±7 days and 42±8 days in Gr. I and II, respectively ($p>0.05$). The recurrent cases after the first episode of symptoms in both groups (4 cases) were retreated with steroid injection without immobilization in a splint and all had satisfactory results. Twenty-eight cases in the second and third episodes in both groups were treated with surgical decompression. Eighteen (67%) of the operative cases in the recurrent group had a separate compartment for the extensor pollicis brevis, which was detected during the operation. All except two of the surgical treatment cases had satisfactory results. A satisfactory result of conservative treatment was associated with the episode of symptoms in both groups ($p<0.05$). Days lost from work in group I were more than in group II ($p<.001$).

DISCUSSION

As we know, the best study design to determine the effectiveness of treatment is a randomized, controlled trial[9]. This was the first randomized, controlled trial to determine the effectiveness of steroid injection with and without immobilization in the splint. We found that the results of immobilization after steroid injection were no different than without immobilization. The patients who did not comply with the treatment were also included in the analysis. This is the technique called intention-to-treat analysis, which means that an individual assigned to a particular intervention group is included in the group's outcome statistics even if one never receives or does not comply with the intervention[10].

The anti-inflamatory property of a steroid and the hydrostatic pressure during injection, which dilates the tunnel of the first compartment, should be the main factors in reducing the symptoms and signs in the patient. This study confirmed the results of previous studies that con-

Table 1. The characteristics of the patients in group I and group II.

	Group I Steroid with Immobilization No. 72	Group II Steroid without Immobilization No. 68
Female : Male	54:18	50:18
Age (yr.)	35 (16-70)	33 (15-68)
Duration of symptoms (weeks)	16.4 ± 8 (2-28)	17.2 ± 7(2-30)
Episode of symptom		
First	40	41
Second	20	18
Third	12	9
Post partum period	20	18
Diabetes Mellitus	18	20
Dominant hand (Rt).	70	66
Occupation		
Farmer	40	48
Housekeeping	32	20
Power of thumb abduction before treatment.	6 ± 4 mmHg.	5 ± 3 mmHg.

Table II. Results of treatment in both groups.

	Group I Steroid with Immobilization No. 72	Group II Steroid without Immobilization No. 68
Episode of Symptoms	Satisfactory*	Satisfactory**
First	35/40 (88%)	34/41 (83%)
Second	15/20 (75%)	14/18 (77%)
Third	3/12 (25%)	3/9 (33%)
Total	53/72 (74%)	51/68 (75%)
Lost follow up	19 (26%)	17 (25%)
Power of thumb abduction after treatment (3 weeks)	25 ± 9 mmHg	27 ± 8 mmHg
Days lost from work#	28 ±6	11 ±7
Poor compliance in wearing of splint	20 (29%)	-
Recurrence of symptoms within one year in the :	15/53 (28%)	17/51 (33%)
First episode	2	2
Second episode	10	2
Third episode	3	3
Duration of recurrent symptoms atter satisfactory results (days)	45 ± 7 (30-62)	42 ± 8 (32-72)

* Chi-square 18.6, p = 0.00009
** Chi-square 9.7, p =.007
# Student t-test p = <.001

servative treatment is still effective for the first episode of this condition[1,2,3,4,7]. However, the days lost from work in the immobilization group were more than in the group with no immobilization. This may be due to the inconvenience of working with the splint. Moreover, twenty-nine percent of the patients in the immobilized group did not comply in wearing the splint.

Clearly, this study could not be designed as a blinded study. Therefore, to reduce the measurement bias, the satisfactory results were not based solely on the subjective symptoms of the patients but also on the objective power measurement of the thumb abduction by the de Quervainometer. The improvement of thumb abduction in both groups was significantly different from the baseline data, but there was no difference between the two studied groups. The successes rates in this study were similar to the previous study[7] (Chi-square 1.88, $p<0.05$). We found that the episode of the disease was associated with the failure rate of the treatment ($p<0.05$) which has not been mentioned before in the literature. We also found that the recurrent rate in females was higher than in males in both groups. The duration of the symptoms was not associated with the success or recurrent rates.

In previous studies, the incidence of the anatomical variation of a separate compartment of the extensor pollicis brevis and abductor pollicis longus tendons was varied between 11 to 73 percent depending upon the sample size and method of the study[7,11,12,13,14,15,16,17,18]. Sixty-seven percent of the recurrent symptoms in the wrists of our study had a separate compartment for extensor pollicis brevis. The varying incidence of the separated first dorsal compartment in wrists may have affected the results of the conservative treatment in previous reports.

In conclusion, steroid injection without any immobilization is an effective treatment for the first episode of de Quervain tenosynovitis.

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