RESEARCH ARTICLE

Management Outcome of de Quervain's Disease with Corticosteroid Injection Versus Surgical Decompression

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Abstract

Background: This randomized clinical trial was undertaken to document the clinical presentation of de Quervain's disease and evaluate the outcome of management with triamcinolone acetonide (TAC) injection versus surgical decompression.

Methods: Half of the patients were assigned to the corticosteroid injection group (group A) and half to the surgery group (group B). In group A, 40 mg of TAC was injected into the affected first extensor compartment. In group B, surgical decompression of first extensor compartment was performed.

Results: There were 56 patients with 38 (67.85 %) females and 18(32.14%) males. The age range was 23-66 years. In group A, one injection was employed among 7(25%) patients whereas two injections among 21(75%) patients. Local complications with injections were observed among 7 patients. Symptomatic relief with injection at 6-weeks was observed among 25% patients whereas recurrence at one year was observed among 9(32.14%) patients. In group B, no critical complications were encountered following surgery; all the patients had symptomatic relief at 6-weeks and there was no case with recurrence at one year.

Conclusion: Surgical decompression provided superior results in terms of providing symptomatic relief at 6-weeks among all patients, absence of complications and no recurrence. The corticosteroid injections (CSI) were associated with the need for repeat injections among 75% cases and a recurrence rate of 32.14% at one year, rendering it to be comparatively a poorer choice.

Level of evidence: II

Keywords: Corticosteroid injections, De Quervain's disease, De Quervain's syndrome, De Quervain's tenosynovitis, Surgical decompression, Triamcinolone acetonide

Introduction

De Quervain's disease is characterized by bothersome radial sided wrist pain and impairment of thumb movements. It is an affliction of the first extensor compartment of the wrist through which the tendons of the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) muscles pass. Anatomic variations of the components within the osseofibrous compartment as well as excessive movements of the contained tendons predispose to the condition. It is primarily a non-inflammatory condition as the basic pathology is a thickened tendon sheath with accumulation of mucopolysaccharide. The thickening causes impingement

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and mechanical obstruction between the gliding tendons and the walls of the compartment, resulting in pain and hindered thumb motion (1-3).

The condition can be treated by conservative measures or certain interventions. The conservative measures include activity modification of the wrist, analgesics, non-steroidal anti-inflammatory drugs (NSAIDS), thumb spica splintage and physical therapy. These measures may work in patients with minimal symptoms; however the majority would continue to have the problem on resuming the initial inciting activity. Next treatment options are the corticosteroid injection and surgical decompression. The intra-sheath corticosteroid injections are effective in a reasonable percentage of patients; however if the problem still persists after repeated injections, surgical decompression is often the only viable treatment option available as the protracted use of steroid injections inevitably results in serious untoward effects (1, 4-6).

The current study was carried out to document the clinical presentation of de Quervain's disease and evaluate the outcome of management with triamcinolone acetonide (TAC) injection versus surgical decompression. Our primary null hypothesis was that "there is no difference in symptom recurrence after one year between corticosteroid injection (CSI) and surgery for recalcitrant de- Quervain's disease. Also there is no difference in pain relief at 6 weeks between CSI and surgery for the recalcitrant de Quervain's disease" Our secondary aim was to assess the number of complications with CSI and surgery over a 12 months period.

Materials and Methods

This randomized clinical trial was conducted over a period of three years. (i.e. from January 2017 to December 2019) Informed consent was taken from the patients. The study followed the ethical protocols as per Helsinki's Declaration-2013 revision. The anonymity of the participants was guaranteed.

The diagnosis was made clinically with history and examination. The symptoms sought in history included radial sided wrist pain, impaired thumb movements, swelling over the radial styloid area, localized tenderness, crepitations on palpation, radiation of pain to the thumb, forearm or shoulder. Positive Eichhoff's maneuver was considered the gold standard. The test was elicited by effecting ulnar deviation of the wrist, while clasping the thumb within the fingers in a fist fashion. This maneuver reproduced the typical pain (7).

The study included all patients of either gender and all ages who had initially not responded to at least 3-months trial of conservative treatment. The conservative treatment included regular use of NSAIDS, modification of wrist movements to avoid overuse of thumb muscles and thumb spica splinting at night. The exclusion criteria included pregnancy, postpartum status and patients who were unwilling for the intervention of corticosteroid injection or surgery.

Twenty eight patients were randomly allocated to the corticosteroid injection group (group A) and twenty eight to the surgery group (group B). Simple random sampling was done with computer generated random number table. The baseline demographic and clinical characteristics of the included patients are summarized in Table 1.

Treatment protocol for the corticosteroid injections (CSI) group

40 mg (1cc) of triamcinolone acetonide was mixed with equal volume of 2% plain lidocaine for the injection. The first extensor compartment was palpated by asking the patient to abduct and extend the thumb. A 26-gauge needle of the locally available insulin syringe was employed for the intra sheath administration of the corticosteroid. The needle was introduced into the tendon sheath at a level 1 cm proximal to the radial styloid. Filling of the sheath was palpated as the fluid wave was generated by the administration of injection. An effort was made to inject part of the solution a bit on the dorsal ulnar aspect to inject a possible EPB sub-sheath.

A second corticosteroid injection was repeated at 6-weeks after the first one, among patients with persistent symptoms.

Treatment protocol for the surgery group

Surgery was performed under local anesthesia and tourniquet control. All patients were managed as day care cases. A 1.5-2 cm longitudinal skin incision was made, centered on the radial styloid. Subcutaneous tissues were carefully dissected to identify and safeguard the dorsal sensory branch of radial nerve (DSBRN) and expose the extensor retinaculum. Also the beginning of the cephalic vein in the operative field was safeguarded. The retinaculum over the first extensor compartment was incised, more on the dorsal ulnar side with excision of 3 mm of retinaculum longitudinally. This ulnar sided opening helped to provide an adequate retaining wall to prevent subsequent postoperative volar subluxation of the contained tendons. All the aberrant tendon slips of APL were released and septations broken. The secondary sub sheath of EPB was meticulously looked for and released accordingly. Skin incision was closed with subcuticular 4/0 prolene sutures. Sterile gauze dressing was applied. Stitches were removed on 14th postoperative day. Following removal of stitches, exercises were encouraged.

Follow up protocol

The first follow up visit was ensured on 5th postoperative day to document any immediate complications such as hematoma formation, wound infection, injection site pain and bruising. The second follow up was done 6-weeks post intervention wherein relief of the symptoms or persistence thereof was established by asking questions regarding the typical clinical features of de Quervain's disease and performing the Eichhoff's maneuver. The need for additional intervention in the form of repeat injections or surgery was also evaluated at this follow up visit. The third follow up visit was ensured 12-weeks post intervention, wherein any late complications were recorded. These included scar hypertrophy, scar widening, skin depigmentation, skin atrophy/thinning and fat atrophy. The final follow up visit was done at

12-months, wherein recurrence or no recurrence was established by employing the aforementioned clinical criteria described for diagnosing the de Quervain's disease.

The outcome primary measure analyzed was the symptomatic relief at 6-weeks post intervention. The secondary outcome measures analyzed included the need for additional interventions, any complications and recurrence at 12-months. The symptomatic relief was defined as total pain relief and a negative Eichhoff's maneuver following the intervention. Recurrence was defined as the re-onset of the diagnostic features of de Quervain's disease as observed at 12-months follow up, following an initial symptomatic relief at 12-weeks previously.

Statistical analysis

For sample size calculation, the formula $n = Z^2\ p\ q\ /\ e^2$ was employed. {Where the "Z" is the standard normal deviate for the 95% confidence interval (CI). It is constant as 1.96 deviant error for 95% CI. The "p" is the anticipated prevalence. The "q" is 1-p. The "e" is margin of error. It is set at 5% (i.e. 0.05).} Now coming to the calculation, $Z^2 = (1.96)^2 = 3.841$; p= 1.8% =0.018 (taking the prevalence of de Quervain's disease to be 1.8% (7); q=1-p; e=5%=(0.05), and so $e^2 = (0.05)^2 = 0.0025$; and a sample size= 27.16 patients.

The study design was kept simple to ensure adherence to the study protocol and minimize drop outs and loss to follow-ups. Patients, who did not agree to adhere to one year follow-up protocol, were excluded before randomization. The intention-to-treat analysis was employed [Diagram 1] (8).

The demographic profile of the patients, interventions instituted and outcomes were all recorded. The data were subjected to statistical analysis using IBM-SPSS for Windows version 21. Numerical data, such as age and the duration of symptoms, were expressed as Mean ± Standard Deviation. Categorical data, such as gender and the side affected were expressed as frequencies and percentages. The percentages of categorical variables were compared by employing chi square test and a *P-value* of less than 0.05 was regarded as statistically significant.

Table 1. Demographic and clinical features among patients of the two groups

Characteristics	Injection group (n= 28)	Surgery group (n= 28)	*P value*
Age (Years)	41.53±8.46	42.21±9.58	0.6
Gender			
Female	19(67.85%)	19(67.85%)	-
Male	9(32.14%)	9(32.14%)	-
Duration (Months)	11.82±3.43	12.50±3.55	0.7
Affected side			
Dominant	16(57.14%)	17(60.71%)	0.8
Non-dominant	12(42.85%)	11(39.32%)	0.8
Clinical features			
Radial sided wrist pain	28(100%)	28(100%)	-
Impaired thumb movements	28(100%)	28(100%)	-
Positive Eichhoff's maneuver	28(100%)	28(100%)	-
Local tenderness	13(46.42%)	14(50%)	0.5
Swelling over the styloid area	6(21.42%)	5(17.85%)	0.8
Crepitations on palpation	2 (7.14%)	3(10.71%)	0.8
Pain radiation to the thumb, forearm or shoulder	2(7.14%)	2(7.14%)	-
Associated factors			
Smartphone overuse	7(25%)	9(32.14%)	0.08
Diabetes mellitus	3(10.71%)	3(10.71%)	-
Occupation in day care service	2(7.14%)	2(7.14%)	-
Security personnel holding gun during duty	1(3.57%)	1(3.57%)	-
Idiopathic category	15(53.57%)	13(46.42%)	0.08

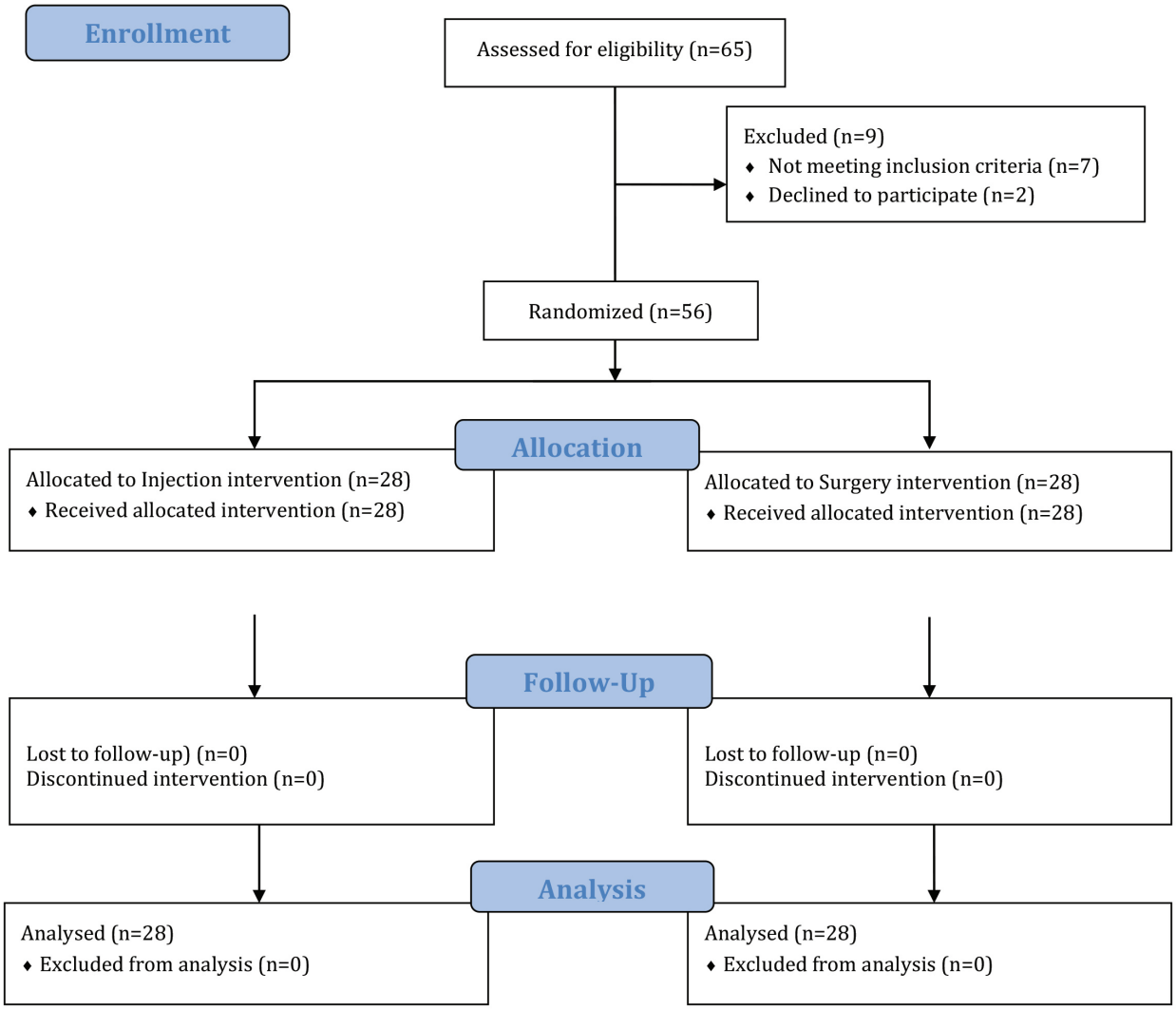

Diagram 1. Flow diagram of he study protocol.

Results

In CSI group, recurrence at one year was observed among 9(32.14%) patients whereas in surgery group there was no patient with recurrence. In CSI group, symptomatic relief at 6-weeks was found among 25% patients whereas in surgery group it was observed among all patients.

In CSI group, local complications of injections were observed among seven patients whereas in surgery group, no complications were encountered following surgery. The local complications in CSI group included depigmentation of skin (n=5; 17.85 %), skin atrophy and thinning (n=1; 3.57%) and fat atrophy (n=1; 3.57%).

In CSI group, one corticosteroid injection was employed among 7(25%) patients whereas two injections among 21(75%) patients.

All the 9 patients in CSI group who presented with recurrence at one year, ended up with surgery.

Table 2 summarizes the various outcome measures compared between the two groups.

Discussion

de Quervain's disease constitutes one of the most common tendinopathies presenting to the hand clinic, however the exact incidence and prevalence is unknown in the local population. Walker-Bone K et al. from the United Kingdom reported 1.3% and 0.5% community prevalence among females and males respectively. With the quick revolution in telecommunication and the liberal availability of electronic devices such as the smartphones, thumb has emerged as a frequently overused part of the hand, hence predisposing it to more frequent de Quervain's disease. Accordingly the condition has also been re-named as texting thumb (9-11).

In this study predominant involvement of female

Table 2. Summary of the various outcome measures compared between the two groups

Outcome Measures	Injection group (n= 28)	Surgery group (n= 28)	*P value*
Symptomatic relief at 6-weeks post intervention	7(25%)	28(100%)	*P < 0.00**
Need for additional interventions	21(25%)	0	*P < 0.00**
Complications encountered			
Depigmentation of skin	5(17.85 %)	0	*P < 0.00**
Skin atrophy and thinning	1(3.57%)	0	*P >0.05*
Fat atrophy	1(3.57%)	0	*P >0.05*
Recurrence at one year	9(32.14%)	0	*P < 0.00**

<0.05* Significant *P value*
>0.05 Insignificant *P value*

patients was observed. Most of the published papers conform to this observation. The disease affects women 3-10 times more often than men (1, 12-16).

In this study majority of the individuals were aged 30-50 years. Several published studies have reported variable age group afflictions with the condition. For instance, Garcon JJ et al in their series reported a mean age was 49 years with a range between 19-84 years. Mehdinasab SA et al found a mean age of 32.6 years with a range of 21-61 years. Sawaizumi T et al observed a mean age of 46 years with a range of 22-77 years (15-17).

In this study majority of the cases were idiopathic and one third had some underlying predisposing causes such as diabetes mellitus, overuse of smartphone and occupational exposure to overuse of thumb. A variety of risk factors have been reported by the published studies. For instance, female gender, pregnancy, early postpartum status, unaccustomed use of thumb and rheumatoid arthritis. In the last two decades, a growing body of evidence has emerged regarding causation of de Quervain's disease by the excessive text messaging and similar activities involving typing on smartphones (9, 13-18).

In this study CSI were observed to be effective in permanently relieving the symptoms in 68% patients. Those patients who had the symptoms for more than 6 months and those with diabetes mellitus had a greater percentage of treatment failures with injections. The published literature has reported success with CSI in 50-80% of patients. Oh JK et al reported 70% short-term success rate following 2 or fewer injections. Kitti et al observed 67% success rate with CSI (1, 19, 20).

In this study patients with pregnancy and lactation were excluded. In de Quervain's disease of pregnancy and lactation, conservative measures are highly effective, and the condition has been reported to resolve spontaneously after completion of pregnancy or cessation of lactation (1, 21).

The patients who don't respond to CSI are reported to have anatomic variations in the first extensor compartment. This is especially true for the EPB which may be lodged in a secondary sub-sheath of its own. Zingas C et al. in their study employed radiopaque dye mixed with a corticosteroid and injected it into the first dorsal compartment. They observed that 13 of 19 wrists failed to demonstrate dye filling the EPB subsheath. This provided evidence that it was technically more difficult to successfully administer the corticosteroid into the EPB sub-sheath. Among other anomalies of the first extensor compartment include the presence of multiple slips of APL. It is important to be aware of these anatomical variations and ensure complete decompression at the time of surgery (1, 22-24).

In the present study, local complications of CSI were observed among 7 patients who needed repeated injections. The published literature has similarly highlighted the possible risks associated with repeated injections in the form of depigmentation of skin in darker skinned individuals, skin atrophy and thinning, fat atrophy and tendon rupture. Cutaneous depigmentation is the commonest among them with an incidence of 5%-10%. The complication of tendon rupture is exceptionally rare. One published case report has reported the rupture of both the APL and the EPB following repeated corticosteroid injections for de Quervain's disease (1, 6, 25-27). Our findings of the current study suggest that repeated CSI are best avoided.

In this study no complications were encountered following surgery. Published studies have reported rare complications associated with surgical release. For instance, insufficient decompression, injury to the dorsal sensory branch of radial nerve, painful neuroma formation, superficial radial nerve entrapment, transient neurologic deficits and tendon subluxations (1).

In the current study no case of tendon subluxation was observed at the one year postoperative follow up. Scheller et al similarly reported a series of 94 patients who had undergone simple tendon decompression. They were followed for a mean period of 15.7 years and none had tendon subluxation. They had resection of the dorsal carpal retinaculum for a maximum of 3 mm to ensure tendon stability. Subluxation of the APL and EPB may occur due to excessive resection of the retinaculum or in the case of surgery in an early stage of the disease because the sheath is thinner. Chronic cases of de Quervain's disease may have thickening of

the retinaculum of the first extensor compartment up to more than 2 mm (measured by ultrasound). This may be a reason why the chronic cases usually don't end up with tendon instability. Especially, volar subluxation of these tendons can cause a painful snapping. Reconstruction of the tendon pulley can be undertaken using different surgical techniques. For instance, a sling procedure using a U-shaped extensor retinaculum graft or a brachioradialis tendon flap. Some authorities have even advocated for a primary reconstruction of the pulley of the first extensor compartment to avoid the subluxation after the primary surgery (28-31).

Surgical decompression provided superior results in terms of providing symptomatic relief at 6-weeks among all patients, absence of complications and no recurrence. The corticosteroid injections were associated with the need for repeat injections among 75% cases and a recurrence rate of 32.14% at one year rendering it to be comparatively a poorer choice.

Authors' contribution: MS designed the study and wrote the manuscript. He performed data collection, analyses and approved the manuscript.

Conflicts of Interest: The author declares that there is no conflict of interest.

Financial disclosure: None declared.

Ethical Issues: The study followed the ethical protocols of Helsinki's Declaration, 2013 revision. Anonymity of the participants was ensured.

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