

# A Comparative Study of Open Surgery Versus Steroid Injection in the Management of Dequervain's Tenosynovitis

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## ABSTRACT

**Introduction:** This study aimed to compare steroid injections and open surgery in the management of Dequervain's Tenosynovitis.

**Material and methods:** This was a prospective comparative study conducted in a tertiary care hospital, a total of fifty patients were included in the study after getting clearance from the research and ethical committee. The patients were assigned into two groups: Group 1 undergoing open surgery and Group 2 receiving steroid injections. The satisfaction was evaluated based on DASH and VAS score. The patients undergoing surgery were also evaluated for the surgical site infection, nerve injury, wound gapping and restricted range of movements. The patients receiving steroid injections were evaluated for subcutaneous atrophy, fat necrosis, weakening or rupture of tendons, and de-pigmentation.

**Results:** Among 50 patients, 48 were female and 2 were male. The mean age of all the patients is 41.4 years and mean follow-up was for 1 year. Nine patients in the steroid injection group were not satisfied following steroid injection and four patients in the surgery group were not satisfied following open surgery. Functional outcomes were good in all patients in the surgery group ( $p < 0.0001$ ). There were no complications in both groups.

**Conclusion:** This study suggests although steroid injection is a therapeutic option for Dequervain's tenosynovitis, open surgery appears to be a more beneficial method with relatively low recurrence and complication rates.

**Keywords:** De Quervain's disease, Tenosynovitis, APL and EPB

## INTRODUCTION

DEQUERVAIN'S DISEASE is described as Stenosing tenosynovitis / Tendovaginitis of the Abductor pollicis longus and extensor pollicis brevis of the first Extensor compartment of the wrist.

It was first described by a Swiss surgeon, Fritz de Quervain a Kocher's Clinic in Berne, Switzerland, in 1895<sup>1</sup>. Individuals occupied with skilled work involving wrist in ulnar deviation with abducted and extended thumb and females with household work are mainly affected by this condition. The disability caused by this condition is highly debilitating leading to restriction of daily activities.

Bunnell comments, "A hand without a thumb is no more than a hook"<sup>2</sup>. In a classical case of dequervain disease functional limitations are so much as rendering thumb functionless.

Though there are various modalities of conservative and minimally invasive management as physiotherapy, splinting and corticosteroid injections they do not address the

pathology of this condition.

The fibrosis of involved tendon sheath may be progressive or stationary. By means of conservative management the fibrotic process never regress or resolve. But continued motion of the Tendons within stenosed sheath further aggravates this condition by progressive proliferation of fibrous tissue and scarring.

Most of the cases that are treated by surgical management have undergone one or the other mode of conservative management like physiotherapy, splinting, or plaster cast. The utility of such therapy usually goes unrecognized for a long period of time, until either the patient demands a change in treatment or the condition is recognized in surgical consultation.

## MATERIAL AND METHODS

This was a prospective comparative study conducted in a tertiary care hospital from September 2018 to September 2020. Fifty patients were included in the study after getting clearance from the research and ethical committee. The patients were assigned into two groups: Group 1 undergoing open surgery and Group 2 receiving steroid injections. The satisfaction was evaluated based on DASH and VAS score. The patients undergoing surgery were also evaluated for the surgical site infection, nerve injury, wound gapping and restricted range of movements. The patients receiving steroid injections were evaluated for subcutaneous atrophy, fat necrosis, weakening or rupture of tendons, and de-pigmentation.

### Inclusion criteria

1. Age group between 20-70 years.
2. Male and female patients.
3. Pain more than 6 months.
4. Pain interfering with daily activities of living.

### Exclusion criteria

1. Age less than 20 years.

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2. Patients having bleeding disorders.
3. Patients having comorbidities such as diabetes mellitus.
4. Comorbid conditions not permitting major surgical procedures
  - Pregnancy
  - Local arthritis
  - Previous surgeries
  - Hypothyroidism
  - Rheumatoid arthritis.

Collection of data from patients as follows.

- a. History by verbal communications.
- b. Clinical examination:

**Finkelstein test:** Thumb opposed and clasped by other fingers. This test consists essentially in ulnar deviation and opposition of the thumb. To carry this out, the fingers clasp the thumb in an opposed position, prior to ulnar deviation of the wrist. Occasionally there may be found thickening and visible swelling about the radial styloid process<sup>3,4</sup>.

**Extensor pollicis brevis (EPB) entrapment test:** The test consists of two parts. First, the patient is requested to bring the metacarpophalangeal joint to a forced extension. Secondly, the carpometacarpal joint of the patient is abducted by the examiner in a stretched manner. Pain during the second part of the test suggests that there may be a separate compartment for the EPB<sup>5</sup>.

- c. Blood investigations like Complete blood picture, Erythrocyte sedimentation Rate.
- d. Clotting time, Bleeding time, Random blood sugar, Renal function test and Serum electrolytes, Thyroid profile.
- e. Radiological examination : X ray wrist PA view, USG
- f. Pre anaesthetic checkup.
- g. Written and informed consent.
- h. Photographic documentation of steroid injection and surgery
- i. Templating data.
- j. Postoperative care.
- k. Postoperative functional outcome evaluation, by Visual analogue scale (VAS), Disabilities of the Arm, Shoulder and Hand (DASH)

Score (0 to 100), before the start of treatment and later at the time of follow up.

#### **Steroid Injection:**

Injection was administered using a dorsoradial approach as a standard procedure. First, the radial styloid was found, steroid was injected to the distal region of the Abductor Pollicis Longus (APL) and Extensor Pollicis Brevis (EPB) tendons, with a 45-degree angle toward the radial styloid. During injection, the presence of resistance indicated that it was on the tendon; therefore, the needle was withdrawn and injected around the tendon. After injection, active/passive extension and flexion movements were initiated.

#### **Surgical procedure**

Under local anaesthesia, under pneumatic tourniquet control, patient in supine position, involved limb kept over

the forearm table. Before rising the pressure in tourniquet, thorough exsanguination done using esmarch rubber bandage for better visualization of constricted tendon sheath. Longitudinal incision is made over the anterior border of the anatomical snuff box over the radial styloid, subcutaneous tissues exposed after identifying the constricted tendon sheath, incision is made on the tendon sheaths of abductor pollicis longus and extensor pollicis brevis. 2 to 3mm of thin strip of dorsally based flap of extensor retinaculum excised. Wound closed in layers. Sterile dressing applied.

#### **First week:** After 48 hrs

- Dressing should be clean and dry.
- While taking bath patient should apply plastic bags covering the forearm, wrist and hand.
- Operated limb should be kept in rest.
- Limb elevation.
- Avoid thumb movements.
- Place that forearm over the chest while sleeping.
- Application of ice will reduce the edema and inflammation.
- Finger stretching exercise at the end of one week.
- Avoid heavy weight lifting.
- Encourage small day to day activities like holding the tumbler, plate and books.
- Avoid contact of water with the surgical site especially sweat.
- If pain is severe, oral medications can be used to reduce the edema and Inflammation - drugs such as serratiopeptidase, trypsin, chymotrypsin and NSAIDs.
- Patient should apply wrist and thumb splint.
- Patient is allowed to wear the splint almost full time.

#### **2nd Week**

- At the end of 2nd week, after cleaning the wound with povidone iodine solution, suture removal should be done.
- Patient is allowed to take bath over the wound area.
- Gentle rubbing over the wound while applying soap.
- Allowed to continue the wrist and thumb splint, moderate weight lifting of around 3-4kgs.
- Patient is allowed to do mild household activities.

#### **3rd Week:**

- Gentle scar massage thrice a day, each episode should last for minimum of 5 Minutes.
- Thumb splint hours can be reduced to 3-5 hrs per day.
- Patient is encouraged to do weight lifting around 5 kgs.
- Allowed to do cooking and lifting children.
- At the end of third week, stretching exercises of the thumb and wrist are allowed.
- At around 4-6 weeks, gradual strengthening exercise along with stretching is allowed, if pain is present the strengthening exercise can be done along with NSAIDs.

#### **Follow up protocol**

- Weekly interval for initial 2 months.
- Twice a week for another 2 months.
- Monthly interval for next 6 months.

- Then once in 3 months.
- All operated cases were followed to a minimum of one to one and a half years.
- Follow up was evaluated by clinical examination by negative finkelstein test and range of movements of thumb and wrist.

## RESULTS

Our study includes 50 diagnosed cases of De Quervain's tenosynovitis. The patients were divided into 2 groups. Group 1 had 29 patients who were managed surgically and group 2 had 21 patients who were managed with steroids. The mean age of all the patients is 41.4 years (range: 20-70 years). Among 50 patients, 48 were female and 2 were male, 43 were affected on the right side and 7 were affected on the left side. Dominant hand was most commonly affected in our study. In our study group, maximum patients (78%) affected were housewives.

### Demographic and clinical data of patients

The successful treatment of DeQuervain's disease is defined as more than 25% reduction in disabilities of arm shoulder hand (DASH) and visual analog scale (VAS) following treatment. In group 1, 25 out of 29 patients has more than 25% reduction in the DASH and VAS score and 4 out of 29 has less than 25 percent reduction in the DASH and VAS score, with a P-value < 0.0001 which is statistically significant. In group 2, 12 out of 21 patients has more than 25% reduction in the DASH and VAS score and 9 out of 21 has less than

25 percent reduction in the DASH and VAS score, with a P-value < 0.0001 which is statistically significant. Since P-value is 0.0207 (<0.05), management with surgery is better than steroid.

On comparing group 1 and group 2, surgically managed patients has better outcome than patients managed with steroid. No recurrence was observed in the surgery group. No serious complication occurred in any patient.

## DISCUSSION

Dequervain's tenosynovitis is due to chronic repetitive activities which leads to tendon sheath inflammation, fibrosis and stenosis. It causes limitation of the wrist and thumb movement. Pathology shows congestion, edema, inflammation, fibrosis, thickening of the tendon sheath. Histology shows infiltration and proliferation of the round cells and fibrous tissues of the tendon sheath. Surgical release of tendon sheath of abductor pollicis longus and extensor pollicis brevis along with excision of thin strip of extensor retinaculum which prevents recurrences. Several case series have been reported that DeQuervain's tenosynovitis is a common occurrence, particularly in females between the third and fifth decades of life.

In this study, the mean age of the patients was 41.4. MA Altay et al reported similar results in regard to age in which mean age was 44. Similarly in study by Abrisham and Hosein et al, Taufiq and Md Zahid et al, mean age of the patients was 45.2 and 45.1 respectively. In this study, Females were affected more than males similar to those studies by M A Atlay et al, Abrisham and Hosein et al, Taufiq and Md Zahid, Johanne and Emile Marteau et al.

Although some reports have shown that it most commonly involves the dominant hand, the relationship with this disease has not been fully clarified yet. However, the facts that the disease is seen less frequently in males and that the dominant Hand is not related to this condition are the main reasons for the uncertain etiology<sup>6</sup>. In our study, consistent with results of other studies, DeQuervain's tenosynovitis was more common in female patients, and it most commonly affected the dominant hand.

In addition, De Quervain's tenosynovitis can be diagnosed radiographically also. Ultrasonography (USG) examination and magnetic resonance imaging (MRI) can be also performed to identify the anatomic variations in patients and to confirm the diagnosis<sup>7,8</sup>. Many authors have suggested that the steroid injection into the tendon sheaths as the first-line treatment in De Quervain's tenosynovitis is effective<sup>9</sup>.

In a study conducted by Harvey et al<sup>10</sup>, corticosteroids were administered to patients once or twice, and success was achieved in 80% of the patients after a 9-year follow-up period. In the aforementioned study, 10 of 11 patients in whom treatment had failed, Abductor Pollicis Longus(APL)

Demographic and clinical data of patients		
	Open surgery (N = 29)	Steroid injection (N = 21)
Age	43.5	39.3
Female (48)	28	20
Male (2)	1	1
Right side	25	18
Left side	4	3
Success (%)	86.2%	57.1%
Failure (%)	13.8%	42.9%

	Mean	SD	P Value
<b>DASH (disabilities of the arm, shoulder and hand)</b>			
Pre Surgery	78.47	3.81	<0.0001
Post Surgery	10.07	6.97	
Pre Steroid	74.38	4.34	<0.0001
Post Steroid	15.7	8.92	
<b>VAS (Visual analog scale)</b>			
Pre Surgery	8.61	0.49	<0.0001
Post Surgery	1.07	2.17	
Pre Steroid	8.14	0.35	<0.0001
Post Steroid	2.80	3.15	

Outcomes in surgically treated group and steroid treated group				
Name of procedure	Total cases n(%)	Success n(%)	Failure n(%)	P value
Surgery	29(100%)	25(86.2%)	4(13.8%)	0.0207
Steroid	21(100%)	12(57.1%)	9(42.9%)	

and Extensor Pollicis Brevis (EPB) tendons were found to be in separate compartments during surgical release. In another study, Witt et al<sup>11</sup> reported that they achieved improvement in 62% of the patients after steroid injection and patients were followed up to 3 years in which only 12% of the patients underwent surgery after steroid injection<sup>12</sup>. Overall, these study findings indicate that the tendons are in separate compartments or showed separate septations in surgical patients in whom steroid injection had failed<sup>13-16</sup> where EPB entrapment test<sup>5</sup> was also found to be positive in the above patients. In our study also, EPB entrapment test was positive in 7 patients where steroid treatment failed.

In literature, it has been reported that complications, such as subcutaneous atrophy, fat necrosis, weakening or rupture of tendons, and depigmentation, may occur following steroid injection for the treatment of DeQuervain's tenosynovitis<sup>17-20</sup>. In our study, no complications were seen in either group. Furthermore, some authors have suggested that steroid injection is part of treatment for DeQuervain's Tenosynovitis however, surgical intervention should be performed when the non-surgical treatments are inadequate.<sup>21</sup>

In a study by Lee et al<sup>22</sup>, 33 patients with DeQuervain's Tenosynovitis underwent open surgery and they reported that the results were very good after a 6-year follow-up. Surgically, a transverse incision was used and no complications were observed. Bouras et al<sup>23</sup> reported in their series of 20 cases that the outcomes were close to perfection after open surgery, and they showed that complications were not noted using longitudinal incision. Abrisham et al<sup>24</sup> also reported that open surgery was superior and longitudinal incision was better than transverse incision after a 5-year follow-up period. In our study, longitudinal incision was used and no complications were observed. Therefore, we suggest that although the direction of surgical incision is critical, the attention of the surgeon also affects the surgical success.

Complications, such as wound site infection, nerve injury, wound gaping, and limitation of the range of motion of the joint, can be seen following open surgery<sup>25</sup>. Volar subluxation of tendons as a rare complication has been also reported in literature. Altay et al<sup>26</sup> performed partial excision of the extensor retinaculum during open surgery to avoid the subluxation complication. They found that the results were consistent with those of complete excision of retinaculum and no complications were observed. In our study, 2-3 mm thin strip of dorsal flap of extensor retinaculum excision was performed and no volar tendon subluxation was observed.

Mellor and Ferris<sup>27</sup> reported 10 complications. One complication (10%) was related to inadequate decompression, six (60%) were related to injury to the superficial branch of the radial nerve, two (20%) were related to wound infections<sup>28</sup> and one (10%) was related to reflex sympathetic dystrophy. Using the longitudinal surgical approach to avoid radial nerve lesions, Bouras et al<sup>23</sup> noted non-aesthetic scars in three of 20 patients. Harvey et al<sup>10</sup> reported 6 complications in 20 wrists treated surgically. Two complications were related to scars, one was a minor wound infection and three were related to

a temporary disturbance of the nerve. There were no neural complications in any of the patients included in our study.

The satisfactory clinical results obtained suggest recommending one-quarter partial removal of the extensor retinaculum on the dorsal side of the wrist in order to prevent problems such as an incomplete release, re-adhesion of the extensor retinaculum and volar subluxation of the tendons after operative treatment of dequervain's disease. Further prospective, randomized comparative studies with larger populations are needed to confirm these results.

Our study group results are comparable with that of Acar E and Memik R<sup>29</sup> study. H. J. KANG<sup>30</sup>, I. H. KOH, J. W. JANG, Y. R. CHOI et al study showed the significantly lower rate of nerve injury and greater scar satisfaction in the endoscopic group. It should be noted that all radial nerve symptoms resolved with follow-up regardless of the methods of operation endoscopic or open release of the first extensor compartment. Although the previous study reported no radial nerve complications in the endoscopic group. Recently published long term follow up studies of both arthroscopic and open methods of surgical release have demonstrated similar outcome. It appears that either surgical technique is acceptable as long as the pathological tissue is accurately identified and adequately resected, although there are advantages and disadvantages to each procedure, no technique appears superior to others.

Based on our observation short term follow up shows excellent outcome, longer term follow up evaluation are required to substantiate our results. In our study, both steroid injection and open surgery gave encouraging results that addresses the pathophysiology of dequervain's disease, with open surgery having more beneficial outcome than steroid injection.

## CONCLUSION

DeQuervain's tenosynovitis, although frequently unrecognized, is a crippling condition which is remedied by either steroid injection or surgery. The condition is far more prone to occur in women, and this condition should be considered in the differential diagnosis of persistent pain at the base of the

thumb in the region of the radial styloid. The chief complaint is either pain in the wrist on using the thumb<sup>31</sup>, or dropping articles because of pain or insecure grip. The Finkelstein test<sup>3,4</sup> is probably "the most pathognomonic objective sign." In our study, DASH and VAS scores of patients managed with steroid and

surgery were compared and results were found to be statistically significant. Abductor Pollicis Longus (APL) and Extensor Pollicis Brevis (EPB) tendons

were seen in separate compartments or showed separate septations in whom steroid injection had failed. EPB entrapment test<sup>5</sup> was also found to be

positive in such patients. Although steroid injection is a treatment option for De Quervain's tenosynovitis, open surgery seems to be a more useful method with relatively low recurrence and complication rates. In our study group

follow up is short term. Long term follow up is necessary before concluding the outcome.

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