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## Surgical decompression of first dorsal compartment with partial one quarter resection of extensor retinaculum in de Quervain's tenosynovitis: A short term prospective result survey

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### Abstract

**Introduction:** Several operative methods have been described for de Quervain's disease, but no definite consensus has emerged in the literature. Sometimes simple release of the extensor retinaculum can cause incomplete relief, whereas re-adhesion and excessive excision of the extensor retinaculum can cause volar subluxation of the abductor pollicis longus and extensor pollicis brevis tendons. Partial removal of the extensor retinaculum may be used as an alternative to solve problems such as incomplete release or re-adhesion and volar subluxation of the tendons. In this prospective study, we evaluated the early results of operative treatment with one-quarter partial resection of the extensor retinaculum when conservative methods have failed.

### Aims and Objectives

- The study was designed to assess functional evaluation in term of patient based scoring system and pain improvement using visual analogue score.
- To record any complications during intra operative and post operative period.

**Materials and Methods:** Thirty patients (30 hands; 25 females and five males; mean age: 48.2 years; range: 20 to 60 years) with de Quervain's disease were surgically treated. The surgical procedure was performed under local infiltration anesthesia. One-quarter partial resection of the extensor retinaculum on the dorsal side of the wrist was performed. During the clinical follow-up period treatment results, a patient-based scoring system and visual analogue scale were used. The mean follow-up duration was 5.83 months (range: 4 to 9 months).

**Results:** In early follow ups there was significant improvement in pain and function, but at final follow up functional score was  $1.33 \pm 0.60$  (p value  $< .001$ ) and mean visual analogue score was  $0.33 \pm 0.60$  (range: 0—10). Two patients with wound infections were treated with adapted antibiotics. All patients were relieved of their symptoms; no triggering, recurrence or volar subluxation of the tendons of abductor pollicis longus or extensor pollicis brevis occurred. With this partial resection technique and according to a treatment scoring system described by Sawaizumi *et al.* 22 hands had excellent results, 6 hands had good results, and 2 hands had fair results; no hand exhibited a poor result.

**Keywords:** De Quervain's disease, surgical treatment, extensor retinaculum, partial resection

### Introduction

De Quervain's disease was first recognized in 1895 as a stenosing tenosynovitis of the abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) within the first extensor compartment of the wrist, formed by the radius and dorsal carpal ligaments<sup>[1-3]</sup> rather than inflammation<sup>[4]</sup>. As pathology specimens demonstrate collagen disorientation and mucoid change<sup>[5, 6]</sup>. It may be more appropriate to regard de Quervain's disease as tendinosis rather than tendinitis. However, the natural history and pathophysiology of de Quervain's disease remain incompletely understood.

Generally, the management of de Quervain's disease is nonoperative in the first instance, but surgery should be considered if conservative measures fail for 4 to 6 months<sup>[8, 9]</sup>. Most surgeons agree that abnormal septation of the compartment and variations in the tendons and their sheaths contribute to the process and help explain the poor response to conservative treatment in certain individuals<sup>[7, 10, 11]</sup>.

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In this situation, operative release of the first dorsal compartment may be inevitable. Surgical release of the first dorsal compartment is an effective procedure for de Quervain's disease and can yield satisfactory results but sometimes may result in volar subluxation of the APL and EPB tendons [7, 8, 12, 13]. Although this is usually asymptomatic, the patient may occasionally become symptomatic [7, 12]. Surgical complications of de Quervain's disease are rare and are usually due to damage to the superficial branch of the radial nerve or due to incomplete release or re-adhesion of the extensor retinaculum [7, 8, 14, 15].

Thus, we hypothesized that partial removal of the extensor retinaculum may be used as an alternative to solve problems such as incomplete release or re-adhesion and volar subluxation of the tendons.

## Materials and Methods

### Aims and Objectives

- (1) The study was designed to assess the regard to three different criteria after surgical decompression in de Quervain's tenosynovitis in which conservative treatment failed.
- (2) To assess clinical results, treatment results and improvement in pain in terms of patient based scoring system and visual analogue score.
- (3) To record any adverse effects and complications.

### Study Center

The study was conducted in department of orthopaedics, S.M.S. Medical college and attached group of hospitals, Jaipur with due permission from institutional ethical committee and review board after taking informed and written consent from the patient from 1.4.2015 to 1.4.2016.

- (1) **Study design:** hospital based, prospective, short term study.
- (2) **Sample size:** sample size were 30 subjects including 10% attrition /dropout / loss of follow up.

### Eligibility Criteria

#### Inclusion Criteria

- a. Patients with history of pain and swelling localized to area of radial styloid.
- b. Age group 20-70 years.
- c. Either sex.
- d. Positive Finkelstein test.
- e. Who have been on conservative management like pain killers, splitting or corticosteroid injection and not respond to conservative treatment.
- f. Patients who give consent to participate in study.

#### Exclusion criteria

- a. Patients with history of recent trauma.
- b. Patients with extrinsic or intrinsic problems such as
  - Local infections
  - Anatomic abnormalities of wrist
  - Septic and tubercular arthritis of wrist
  - Cases with cervical radiculopathy
  - Lateral epicondylitis of humerus
  - Rotator cuff lesions
- c. Patients who refuse to participate in study.

### Clinical Assessment

Clinical history: To elicit duration of symptoms, specific aggravating / relieving factors, any other significant medical / surgical illness specially diabetes mellitus, any other

significant orthopaedic condition.

### Assessment of pain

Simple pain score was recorded on 10 cm visual analogue scales, pain on movement and rest pain during the day.

### Assesment of function

#### Patient Based Scoring System for Clinical Evaluation

- 1 = no symptoms, normal hand activities
- 2 = mild pain, normal hand activities
- 3 = moderate pain, reduced hand activities
- 4 = severe pain, no work activities

### Assesment of wrist radiograph

- (a) Radiographs may be used to rule out fracture, arthritis, or other causes, based on the patient's history and presentation.
- (b) In some patients of dequervain tenosynovitis, there is localized osteopenia of the wrist.

### Treatment option

All patient included in the study was initially treated with conservative means.

Treatment consisted of single injection of suspension containing 40 mg of methylprednisolone acetate and 1 ml 1 percent solution of lidocaine into first dorsal compartment through a 22 gauge needle one cm proximal to radial styloid process and angled distally at 45 degree to the longitudinal axis of forearm. Confirmation that the injection was in proper compartment was accomplished by observation of filling of tendon sheath distal to annular ligament of first dorsal compartment.

Another mode of conservative treatment was thumb spica splint extending from proximal part of forearm to the interphalangeal joint of thumb to maintain the wrist in 20 degrees of dorsiflexion and metacarpophalangeal and interphalangeal joints of thumb in extension for 3 weeks.

Patients with de Quervain's disease who did not respond to conservative treatment with analgesics, splintage and local steroid injection were treated surgically.

### Surgical technique

All procedures were performed with only local infiltration anesthesia (3—4mL of 2% lidocaine HCL) under pneumatic tourniquet control. A 2—3 cm transverse skin incision was made over the first dorsal compartment about 1 cm proximal to the tip of the radial styloid process. Sensory branches of the radial nerve and vascular structures were identified and protected. The exposed extensor retinaculum over the first dorsal compartment was sharply incised along the dorsal margin and APL and EPB tendons were identified. Particular attention was paid to identify any anatomical variations in the compartment. Extra septations were excised if they were found. If there was a ganglion within the first compartment, then it was resected. In addition to these surgical applications, we performed one-quarter partial removal of the dorsal portion of the extensor retinaculum. The tourniquet was then deflated and hemostasis was established. The skin was closed with 3.0 or 4.0 non-absorbable monofilament sutures, and a dressing was applied.

### Post Procedural Physical Therapy

Postsurgical patients are recommended to be placed in a thumb spica splint for 1 to 2 weeks to allow for healing and immobilization. The splint is typically discontinued when the

sutures are removed, approximately 10–14 days after the surgery. Once the splint is discontinued, a formal Occupational therapy consultation is performed to assess for postoperative edema, scar sensitivity, ROM deficits as well as deficits in nerve function for motor and sensation. Two weeks postoperatively, active and active-assisted range of motion exercise is initiated in an effort to decrease stiffness and promote healing of the affected joints. Stretching the thenar musculature and forearm extensors /flexors is initially introduced to allow for pain-free and smooth gliding of the APL and EPB tendons within the first dorsal compartment, followed by unweighted eccentric hammer curl exercises in the direction of ulnar deviation blocking radial deviation. Approximately, 4 weeks postoperatively, gentle strengthening is initiated with a focus on simulating the patient’s work and leisure activities. Resisted eccentric thumb extension and abduction exercises are then performed in week 4. Finally in week 5, resisted eccentric wrist flexion and extension as well as forearm pronation and supination exercises are introduced.

**Post Procedural Follow Up**

TIMING: after –

- 2<sup>nd</sup> week
- 4<sup>th</sup> week
- 8<sup>th</sup> week
- 16<sup>th</sup> week

**Clinical Evaluation of**

1. Any specific complaints, as reported by the patient.
2. Evaluation of pain by visual analogue scale.
3. Evaluation of function by patient based scoring system

**Final outcome assessment**

Was done with comparison of patient based scoring system visual analogue scale at first visit at 2 week, 4 weeks, 8 weeks and 16 weeks.

The treatment results were categorized into four groups:

**Excellent:** no pain or disruption of daily life

**Good:** occasional pain but no disruption of daily life

**Fair:** reduced pain but disruption of daily life

**Poor:** continued or worsening pain and disruption of daily life

**Results and Discussion**

All the patients were relieved of their symptoms, with no triggering, recurrence or volar subluxation of the APL and EPB tendons. All patients returned to their normal activities. At the final follow-up visit, Finkelstein’s test was negative in all cases. There were no instances of crepitus, squeaking or sensory deficits of the superficial radial nerve. All females were housewives exposed to manual work. At the last follow-up exam, the mean functional score was 1.33 (range: 1–3) in the clinical evaluation: 23 hands had no symptoms; 11 hands had mild pain; two hands had moderate pain; and no hand had severe pain. Furthermore, treatment results were excellent in 22 hands (73.3%), good in 6 (20%), and fair in two (6.7%); no hand showed a poor result. Two patients who with fair results indicated that they feel occasional moderate pain when loading the effected wrist during manual work. The mean VAS score was 0.33 (range: 0–10) among all cases. Cosmetically acceptable scars were present in all cases.

**Table1:** Comparison of functional score

		Mean	Std. Deviation	Mean differences	P value
Pair 1	Pre	3.33	0.479	1	0.06
	Post (4 week)	2.33	0.479		
Pair 2	Pre	3.33	0.479	1.56	<0.001 (S)
	Post (8 week)	1.76	0.568		
Pair 3	Pre	3.33	0.479	2	<0.001 (S)
	Post (16 week)	1.33	0.606		

Test applied: Paired t test

**Table 2:** Comparison of VAS score

		Mean	Std. Deviation	Mean differences	P value
Pair 1	Pre	5.13	0.93	1.73	<0.001 (S)
	Post (4 week)	3.4	0.77		
Pair 2	Pre	5.13	0.93	3.5	<0.001 (S)
	Post (8 week)	1.63	0.55		
Pair 3	Pre	5.13	0.93	4.8	<0.001 (S)
	Post (16 week)	0.33	0.606		

Test applied: Paired t test

**Table 3:** Inter- group comparison of functional score a various time interval

	Mean	SD	Minimum	Maximum	P value
Pre	3.33	0.47	3.00	4.00	<0.001 (S)
Post (4 week)	2.33	0.47	2.00	3.00	
Post (8 week)	1.76	0.56	1.00	3.00	
Post (16 week)	1.33	0.606	1.00	3.00	

Test applied: ANOVA

**Table 4:** Inter- group comparison of VAS score a various time interval

	Mean	SD	Minimum	Maximum	P value
Pre	5.13	0.93	4.00	7.00	<0.001 (S)
Post (4 week)	3.40	0.77	2.00	5.00	
Post (8 week)	1.63	0.55	1.00	3.00	
Post (16 week)	0.33	0.606	.00	2.00	

Test applied: ANOVA

### Discussion

The surgical results of 30 patients (30 hands) with de Quervain's disease from 2015 to 2016 with an average follow-up period of 5.83 months demonstrated 94% excellent or good clinical results. All patients were relieved of their symptoms and returned to their normal activities. There were only two complications (one wound infection and one delayed wound healing). In the present study, patients were evaluated with regard to three different criteria. The first of these clinical assessments, the second evaluation of treatment results and the final evaluation of pain were used. On the other hand, the absence of a control group, a shorter follow-up duration and a limited number of patients may be considered limitations of the study.

Anatomical variations of the first dorsal compartment have been reported from 20 to 58% of cases [7, 10]. These variations may explain the poor response to conservative treatment in some de Quervain's patients. In the present study, we encountered an abnormal septation between the APL and EPB tendons in three hands (8%).

Most anatomical variations in tendon structure can cause persistent or recurrent pain due to incomplete surgical release of the tendon sheath [8, 15]. In our surgical technique, APL and EPB tendon sheaths were released; then, the extensor retinaculum was released and one-quarter partial removal of the extensor retinaculum was performed on the dorsal side of the wrist. This method was necessary to prevent incomplete release or re-adhesion of the extensor retinaculum. Additionally, avoiding excessive excision of the extensor retinaculum prevents volar subluxation of the tendons. In our series, with one-quarter partial removal of the extensor retinaculum on the dorsal side of the wrist, we did not encounter any volar subluxation of the tendons.

### Conclusion

- The technique for surgical decompression is known to most of the orthopedic surgeons and is easy to perform as compared to newer technique such as omega pulley plasty or distally based slip of brachioradialis tendon slip which is not that easy to perform for the surgeons who are new to the technique. This technique has a steep learning curve and the surgeon masters it eventually over a period of time.
- Time taken for regaining complete functionality of wrist and thumb was little bit more but the p value showing significant return of activity.
- Functional outcomes measured with patient based scoring system and visual analogue score showed improved functional scores with values showing significant.
- No complication related to scar or deep infection.
- Complication like hypoesthesia over thumb lead us to conclusion that the anatomic relationship of the radial nerve to the first dorsal compartment must be understood in order to prevent complicating injuries to this structure during the surgical procedure because terminal divisions of the radial sensory nerve lie immediately superficial to the compartment.

- At the end of the study, patients reported a good and comfortable range of motion at wrist joint and hence providing a good satisfaction score with the procedures.
- On the basis of 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 de Quervain's disease. Further prospective, randomized
- Comparative studies with larger populations are needed to confirm these results.

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