

Comparative Efficacy of Release Surgery versus Steroid Injection in the Management of De Quervain's Tenosynovitis: A Randomized Controlled Trial

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Abstract:

Background: De Quervain's tenosynovitis (DQT) is a common condition characterized by pain in the wrist and thumb, often affecting individuals engaged in repetitive hand movements. This study aims to compare the efficacy of steroid injections versus surgical release in treating DQT and to assess the demographic characteristics of affected patients.

Methods: A prospective study was conducted at Hindu Rao Hospital over two years, involving 54 adults diagnosed with DQT. Participants were randomly assigned to receive either steroid injections or surgical release. Inclusion criteria included clinically diagnosed DQT with pain affecting daily activities, while those with inflammatory diseases, prior wrist injuries, or cognitive impairments were excluded. Data on demographics, treatment outcomes, complications, and recurrence rates were collected and analyzed.

Results: The study population consisted of 42 females (78%) and 12 males (22%), with a mean age of 33 years. Both treatment groups showed similar outcomes, with no significant differences in complications or recovery rates. Complications were reported in 17% of patients, including hypopigmentation and numbness. The findings suggest that both steroid injections and surgical release are effective treatment options for DQT.

Conclusion: This study underscores the high prevalence of DQT among females and highlights the effectiveness of both treatment modalities. Given the comparable outcomes, treatment choice may depend on patient preference and severity of symptoms, emphasizing the need for individualized management strategies in clinical practice.

Keywords: De Quervain's tenosynovitis, Clinical practice, Steroid injections, Surgical release.

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Introduction

De Quervain disease, often referred to as gamer's thumb or mother's thumb, is a prevalent condition affecting the wrist. It is characterized by constrictive tenosynovitis of the abductor pollicis longus and extensor pollicis brevis tendons located in the first extensor compartment of the wrist. This condition involves thickening and buildup of mucopolysaccharides within the tendon sheaths of these muscles, which pass under the extensor retinaculum in the first dorsal compartment. Rather than being an acute inflammatory response, tendinosis represents a degenerative process known as myxoid degeneration, resulting from mechanical stress on the APL and EPB tendons. Increased friction among the contents of this canal can lead to pain and tenderness in affected individuals. Those most commonly impacted include manual laborers

who frequently position their wrists in ulnar deviation with adducted or extended thumbs, as well as women engaged in home-based activities [1-4]. The disability associated with this condition can be quite severe, significantly hindering daily tasks.

There is a range of treatments available for De Quervain's Tenosynovitis, starting with non-surgical options such as rest, splinting, casting, nonsteroidal anti-inflammatory drugs (NSAIDs), and local steroid injections. In contrast, surgical intervention involves the release of the first extensor compartment. The fibrosis of the affected tendon sheath can be either static or progressive. With conservative treatment methods, the fibrotic changes typically do not improve or diminish. For patients experiencing complications that persist for

over six months, surgical release often offers a lasting solution due to the low recurrence rate following surgery [5,6].

Steroid injections and surgical release of the first extensor compartment are commonly utilized treatments for De Quervain's tenosynovitis. Several studies indicate that there is no significant difference between these two prevalent treatment options [7,8]. Given their widespread use in managing De Quervain's tenosynovitis, the current study aims to compare the outcomes of steroid injections versus surgical release of the first extensor compartment. Additionally, it seeks to determine which treatment is preferred and to assess complications and recurrence rates associated with each method.

Materials and Methods

This prospective study was conducted in the Department of Orthopaedics at Hindu Rao Hospital, located in Malka Ganj, Delhi, over two years from 2020 to June 2022. The study population consisted of adults diagnosed with De Quervain's Tenosynovitis, who were selected from both the Orthopaedic outpatient department and the Orthopaedic emergency unit at the hospital. A random sampling method was employed for selecting participants. A minimum sample size of 54 patients who met the inclusion criteria was established to ensure the validity and reliability of the findings.

Inclusion Criteria: The study included patients who had been clinically diagnosed with De Quervain's tenosynovitis and experienced pain that interfered with their daily activities. Participants were aged between 18 and 70 years and comprised both sexes.

Exclusion Criteria: The study excluded participants who had inflammatory diseases such as rheumatoid arthritis or gout, those with a previous injury to the wrist, individuals who had undergone a previous release or received injectable steroids for De Quervain's tenosynovitis, and patients with other symptomatic upper limb conditions, including rotator cuff tears or impingement, lateral epicondylitis, or carpal tunnel syndrome. Additionally, individuals with cognitive impairments that limited their ability to complete questionnaires were also excluded from the study.

Research Design

A detailed history of patients was taken, including Polyarthralgia, trauma, previous wrist or steroid injection surgery, previous surgery, and allergy to Lignocaine. Patients were assessed and evaluated before and after the procedure using the QuickDASH score and VAS Score. In one group, release surgeries were performed under anesthesia, with a tourniquet applied to identify the sensory

branches of the radial nerve. During surgery, an oblique or transverse skin incision was made over the first Extensor compartment, and deep layers of skin were gently dissected longitudinally. The annular ligament was finely incised, and the release of the tendons of the abductor pollicis longus (APL) and EPB was confirmed. After hemostasis, the skin was anatomically closed with 3/0 silk sutures, and the wound was dressed and a bulky bandage applied. In the early postoperative period, dressings were made smaller to allow wrist movements, and training was given to patients and their relatives about frequent mobilization to maintain joint range of motion. Analgesics were emphasized to bring the wrist to full flexion-extension.

In another group, a steroid injection was performed using a dorso radial approach to treat a radial styloid. The injection was performed to the distal of the APL and EPB tendons, with a 45-degree angle towards the radial styloid. If resistance was detected, the needle was withdrawn and injected around the tendon. After the injection, active/passive extension and flexion movements were initiated. Post-procedure care included an NSAID and oral antibiotic, dressing changes every three days, and removal of sutures in the second week for the surgical release group. For the steroid injection group, ice fomentation, thumb splint, NSAID, and physiotherapy exercises were advised. Patients were examined after 1 month, 3 months, and 12 months, and satisfaction was assessed using the 10-point Visual Analogue scale and 0-100 QuickDASH Score. Overall satisfaction rates were evaluated using VAS scores of 0-10: 0- Very Satisfied; 1-3 Satisfied; 4-5 Mild Satisfied; 6-7 Dissatisfied; >8 Very Dissatisfied. In QuickDASH Score of 0-100: 0- No Disability; 100- Most Severe Disability.

Statistical Analysis: The study used Kolmogorov-Smirnov tests to assess normality in continuous data, followed by statistical tests and descriptive statistics for categorical data. Parametric data was analyzed using the student's T-Test/Z-Test, while non-parametric data was analyzed using the Kruskal Wallis test and Mann Whitney U test. Nominal categorical data was compared using Chi-square or Fisher's exact test, and a correlation coefficient was used to observe linear relationships. Major data analysis packages and spreadsheets like R and Microsoft Excel were used, and a p-value less than 0.05 was considered significant.

Ethical Approval: The study was conducted by ethical standards, and approval was obtained from the institutional ethical committee. Written informed consent was obtained from all the patients.

Results

The research was carried out in the Orthopaedics Department of Hindu Rao Hospital. A total of 54 patients diagnosed with De Quervain's tenosynovitis were split into two treatment groups. One group consisted of 27 patients who underwent tendon release surgery, while the other group included 27 patients receiving conventional treatment through steroid injections. Initial data was gathered regarding age, gender, occupation, and the affected side. Follow-up evaluations were conducted at intervals of 1 month, 3 months, and 1

year. During each follow-up, assessments were made for any complications.

Table 1 shows that both groups have similar mean ages (33 and 34 years) with no significant age difference ($p=0.3$). Gender distribution is identical, with 21 females and 6 males in each group, and no significant difference ($p>0.9$). The types of occupations are also comparable, with a p -value of 0.14 indicating no significant difference. Lastly, the affected side (left or right) is evenly distributed across both groups, with a p -value of 0.4, confirming no significant difference in this variable.

Table 1: Comparison of variables at recruitment between two groups (N=54).

| Variable ¹ | Total, N=54 (%) ² | Release, N=27 (%) ² | Steroid, N=27 (%) ² | p-value ³ |
|--|------------------------------|--------------------------------|--------------------------------|----------------------|
| Age (Mean \pm SD) | 33 \pm 8 | 32 \pm 7 | 34 \pm 8 | 0.3 |
| Gender | | | | >0.9 |
| Female | 42 (78%) | 21 (78%) | 21 (78%) | |
| Male | 12 (22%) | 6 (22%) | 6 (22%) | |
| Type of Occupation* | | | | 0.14 |
| Heavy Labor | 6 (11%) | 5 (19%) | 1 (3.7%) | |
| Housework | 31 (57%) | 16 (59%) | 15 (56%) | |
| Sitting / Desk job | 17 (31%) | 6 (22%) | 11 (41%) | |
| Affected Side | | | | 0.4 |
| Left | 17 (31%) | 10 (37%) | 7 (26%) | |
| Right | 37 (69%) | 17 (63%) | 20 (74%) | |
| ¹ *Heavy Labor include farmer, labourer, mechanic and plumber; Sitting/ Desk job includes student, teacher, engineer and driver while housework include housewife and maid. | | | | |
| ² Mean \pm SD ; n (%) | | | | |
| ³ Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test | | | | |

Fig. 1 presents a combined box and violin plot illustrating the age distribution of two groups labeled "Letters" and "Mental." The box plot component displays the median age and interquartile range, indicating the central tendency and spread of ages within each group. The whiskers extend to show the range of most data points, while outliers are

represented as individual points outside the whiskers. The violin plot adds density estimation, revealing the distribution shape and highlighting where ages are more concentrated. This visualization allows for a comprehensive comparison of age distributions between the two groups, showcasing both central values and the overall distribution patterns.

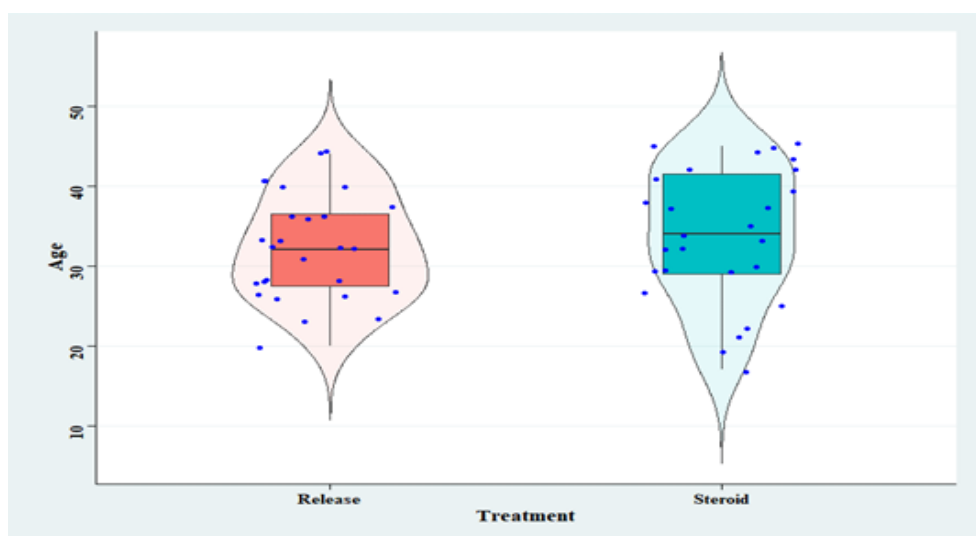


Figure 1: Box and Violin Plot showing the distribution of age over two groups (N=54).

Table 2 presents a comparison of complications experienced by participants in two treatment groups: "Release" and "Steroid". It shows that 9 participants (17%) in the Release group reported complications, while 45 (83%) did not. In the Steroid group, 5 participants (19%) experienced complications, with 22 (81%) reporting none. The table further details the types of complications in

the Steroid group, which included 3 cases of hypopigmentation, 2 instances of numbness over the thumb, 1 case of scar tenderness, 1 instance of wound gaping, and 2 cases of relapse. Overall, the results indicate that while complications were present in both groups, they were statistically non-significant.

Table 2: Comparison of complications between two groups (N=54).

| Variable ¹ | Total, N=54 (%) | Release, N=27 (%) | Steroid, N=27 (%) |
|---|-----------------|-------------------|-------------------|
| Complications | | | |
| Present | 9 (17%) | 4 (15%) | 5 (19%) |
| Absent | 45 (83%) | 23 (85%) | 22 (81%) |
| ¹ Out of 9 Complications 3 were hypopigmentation, 2 were numbness over thumb, 1 had scar tenderness, 1 had wound gaping and 2 had relapse* | | | |

Discussion

The comparative efficacy of release surgery versus steroid injection in managing De Quervain's tenosynovitis reveals significant insights from recent studies. Corticosteroid injections have demonstrated a higher success rate than immobilization, with a relative risk of 1.61 for treatment success [9]. In a direct comparison, ultrasound-guided steroid injections showed outcomes comparable to surgical release, with both methods significantly improving pain and function over time [7]. Surgical release remains the gold standard, providing reliable symptomatic relief, particularly in cases resistant to conservative treatment. However, steroid injections can be effective, achieving an 80% success rate within two injections [10]. Ultimately, while both treatments are viable, the choice may depend on the severity of the condition and patient preference, with steroid injections serving as a less invasive initial option [11,12].

The mean age at presentation in our study was 33 ± 8 years, with a significant p-value of 0.3. This was like the median age group of 34 years in a study conducted by Tam Eunice Wai-si *et al.* [13]. Omoke and Nnadozie's study included 41 DQT patients, in which ages ranging from 22 to 70. The study's mean age group was 38.9 ± 11.27 years, which was comparable to the age group in our study [14].

Our study included 54 patients, of whom 12 (22%) were male and 42 (78%) were female. The incidence of DQT was found to be higher in females than in males, as was also observed in research by Raza *et al.* [15] in which 94 of the 97 patients were female and only 3 were male. According to Stahl *et al.*'s research of 189 individuals, 81% of the patients were female, indicating that women are more likely than men to acquire DQT [16].

Of the 199 patients in the study by Oh *et al.*, 187 were female and 35 were male, which again benefits our study group. Thus, among DQT patients, a significant female predominance was observed [17]. The right hand was more frequently impacted in our study than the left. 13 (31%) of the 54 individuals in the study experienced complaints in their left hand, while 37 (69%) had complaints in their right.

According to a study by Morshed *et al.*, out of 29 patients, 75.9% had problems with their right hand and 24.1% with their left [18]. The most frequently impacted occupations, according to our research, are heavy laborers like farmers, laborers, mechanics, and plumbers; sitting/desk jobs like students, teachers, engineers, and drivers; and house workers like housewives and maids. People who were used to doing manual labor made up the great majority.

According to a study done by Rani in a medical facility in southern India, jobs requiring prolonged hand and finger use as well as hand straining are factors that contribute to DQT [19]. Wringing a washcloth, holding a golf club, raising a child, hammering a nail, and other actions can cause complaints, according to a study by Goel and Abzug [20].

Out of the 9 individuals in our research who experienced difficulties, 4 underwent release surgery and 5 received steroid injections. There was no statistical significance in the results. The release of the first extensor compartment for de Quervain tenosynovitis is a safe and successful surgical method that offers good exposure, maintains essential structure, and avoids potential tendon subluxation in the postoperative phase, according to a study by Gundes and Tosun [21].

Conclusion

In conclusion, our study demonstrates a significant female predominance in patients with De

Quervain's tenosynovitis, with the right hand being more frequently affected, likely due to occupational factors involving repetitive wrist movements. Both surgical release and steroid injection treatments yielded comparable outcomes, with no statistically significant differences in complications or recovery rates, indicating that either approach can be effective based on individual patient needs. These findings highlight the importance of considering occupational influences in the diagnosis and management of DQT and suggest that further research with larger sample sizes and extended follow-up is necessary to refine treatment strategies for this condition.

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