

Functional Outcomes Following Release Surgery Versus Steroid Injection in Patients with De Quervain's Tenosynovitis: An Evaluation of Pain Reduction and Activity Levels

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ABSTRACT

Background: De Quervain's tenosynovitis is a common condition characterized by pain in the wrist, primarily affecting the abductor pollicis longus and extensor pollicis brevis tendons. This study aims to compare the functional outcomes of surgical release versus steroid injection in patients with De Quervain's tenosynovitis, focusing on pain reduction and activity levels.

Methods: A prospective study was conducted at Hindu Rao Hospital over two years, involving 54 adults diagnosed with De Quervain's tenosynovitis. Participants were randomly assigned to receive either surgical release or steroid injection. Pain and functionality were assessed using the Visual Analog Scale (VAS) and the Disabilities of the Arm, Shoulder, and Hand (DASH) score at baseline, one month, three months, and one-year post-treatment.

Results: Both treatment groups showed significant improvements in VAS and DASH scores over time. The steroid injection group exhibited greater short-term benefits, particularly at one and three months, while the surgical release group demonstrated sustained pain relief and functional improvement at the one-year follow-up. Notably, the surgical intervention was associated with a lower recurrence rate of symptoms.

Conclusion: Both surgical release and steroid injection are effective treatments for De Quervain's tenosynovitis, with the choice of intervention depending on individual patient factors and preferences. Future studies should explore long-term outcomes and the impact of patient-specific characteristics on treatment efficacy to enhance personalized management strategies.

Key-words: DASH score, De Quervain's tenosynovitis, Steroid injection, Surgical release, VAS score.

INTRODUCTION

De Quervain's tenosynovitis, first described by Fritz de Quervain in 1895, is characterized by pain and tenderness in the first extensor compartment of the wrist, primarily affecting the abductor pollicis longus and extensor pollicis brevis tendons due to non-inflammatory thickening of the tendon sheath ^[1].

This condition is more prevalent in women, particularly those aged 30-50, and can be exacerbated by repetitive motions or trauma ^[2]. Treatment options include non-operative methods such as anti-inflammatory medications, splinting, and local steroid injections, which are often effective for mild cases ^[3]. However, surgical release may be necessary for patients who do not respond to conservative treatments, demonstrating excellent functional outcomes ^[1]. The choice between these interventions depends on the severity of the condition and the patient's response to initial treatments ^[3].

There are several therapies for De Quervain's Tenosynovitis, beginning with non-surgical methods such

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as rest, splinting, casting, nonsteroidal anti-inflammatory medications (NSAIDs), and local steroid injections. In contrast, surgical surgery includes releasing the first extensor compartment. The fibrosis of the damaged tendon sheath may be static or progressive. Fibrotic alterations are rarely improved or reduced with conservative treatment techniques. Because of the low recurrence rate after surgery, surgical release is frequently a long-term option for patients with difficulties that last more than six months^[4,5].

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^[6,7]. Given their widespread use in managing De Quervain's tenosynovitis, the current study aims to compare functional outcomes following release surgery versus steroid injection in patients with De Quervain's tenosynovitis.

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 student's T-Test/Z-Test, while non-parametric data was analyzed using 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 in accordance with 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

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

Table 2 compares the Visual Analog Scale (VAS) scores for pain between two treatment groups, Release and Steroid, at four time points: pre-operative, 1 month, 3 months, and 12 months post-treatment, with each group consisting of 27 participants for a total of 54. The scores are presented as medians with interquartile ranges

(IQRs), reflecting the distribution of pain levels within each group. While both groups show a general decrease in median VAS scores over time, indicating reduced pain, the statistical analysis reveals no significant differences between the groups at the pre-operative stage and at the 1-month and 12-month follow-ups, with p-values of

0.3 and 0.2, respectively. However, the 3-month follow-up shows a significant difference with a p-value of 0.01, suggesting that the treatment effects may differ at that specific time point. Overall, the data indicates that both

treatments lead to pain reduction, but the differences in effectiveness are not consistently significant across all time points.

Table 2: Comparison of VAS score at Baseline and different followup between two groups

VAS Score	Total, N=54 ¹	Release, N=27 ¹	Steroid, N=27 ¹	p-value ²
Pre-operative	8 (8, 9)	9 (8, 9)	8 (8, 9)	0.087
Follow up at 1 month	3 (3, 4)	3 (3, 4)	4 (3, 4)	0.3
Follow up at 3 months	2 (1, 2)	2 (1, 2)	2 (1, 2)	0.2
Follow up at 12 months	1 (0, 1)	0 (0, 1)	1 (0, 1)	0.064

¹Median (IQR); ²Wilcoxon rank sum test

The VAS score changed over time within the two groups are presented in Fig. 1. The Friedman rank sum test demonstrated a statistically significant difference across follow-up for 54 individuals who underwent release surgery (27) or steroid injection (27) over four observations (baseline and follow-up at 1, 3, and 12 months). The effect size WKendall was greater in the

event of release surgery (0.96, 0.93, 1.0) than in the case of steroid injection (0.89, 0.83, 1). This global effect was calculated using a post-hoc paired Durbin-Conover test with bon-ferroni adjustment, and all pairs produced significant findings. While steroid injections had outliers with more than four VAS scores at one-year follow-up, release surgery does not exhibit a similar phenomenon.

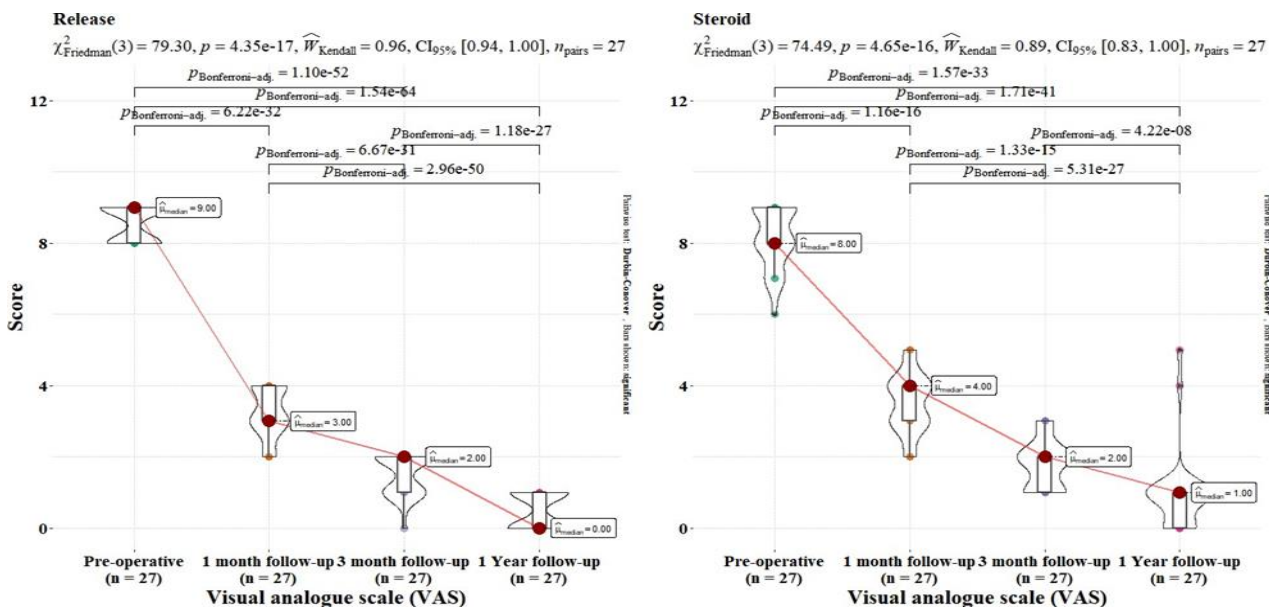


Fig. 1: Box and Violin plot of two groups showing change of VAS score over one year span

Table 3 shows the DASH score at baseline and different follow-ups within the two groups. In the pre-operative phase, the mean DASH score for the Release group was 76.5±4.0, while for the Steroid group, it was 73.4±6.9. By the one-month follow-up, the Release group's score significantly improved to 24±7 compared to the Steroid group's 29±8, and both groups continued to show

improvement at the 3-month and 12-month follow-ups. The p-values in the table indicate the statistical significance of differences between the two groups at each time point. A p-value of less than 0.05 suggests that the difference is statistically significant. For the pre-operative and one-month follow-up periods, the differences are statistically significant (p=0.030 and

p=0.024, respectively). Similarly, a significant difference was found at the three-month follow-up (p=0.029). However, at 12 months, the difference in DASH scores was not statistically significant (p=0.201), suggesting that both treatments might lead to similar long-term

outcomes. The analysis was performed using Welch's two-sample t-test, which is used to compare the means of two independent samples that may have unequal variances.

Table 3: Comparison of DASH score at Baseline and different follow-up between two groups

DASH Score	Total, N=54 ¹	Release, N=27 ¹	Steroid, N=27 ¹	p-value ²
Pre-operative	75.1±5.8	76.8±4.0	73.4±6.9	0.030
Follow up at 1 month	27±8	24±7	29±8	0.024
Follow up at 3 months	14.8±4.4	13.5±4.0	16.1±4.5	0.029
Follow up at 12 months	8.90±6.38	9.31±2.11	8.49±8.84	0.6

¹Mean±SD; ²Welch Two Sample t-test

Fig. 2 shows the change in DASH score over time within two groups. The Friedman rank sum test indicated a statistically significant difference in DASH scores over time among 54 patients undergoing either release surgery (27 patients) or steroid injection (27 patients), with follow-up assessments at baseline, 1 month, 3 months, and 12 months. The effect size measured by Kendall's W was higher for the steroid injection group at

0.92 (95% CI: 0.84, 1.0) compared to the release surgery group at 0.89 (95% CI: 0.86, 1). Post-hoc analysis using the Durbin-Conover test with Bonferroni correction revealed significant differences across all pairwise comparisons. Notably, the steroid injection group exhibited outliers at the one-year follow-up, where some patients had DASH scores exceeding 30, while no similar outliers were observed in the release surgery group.

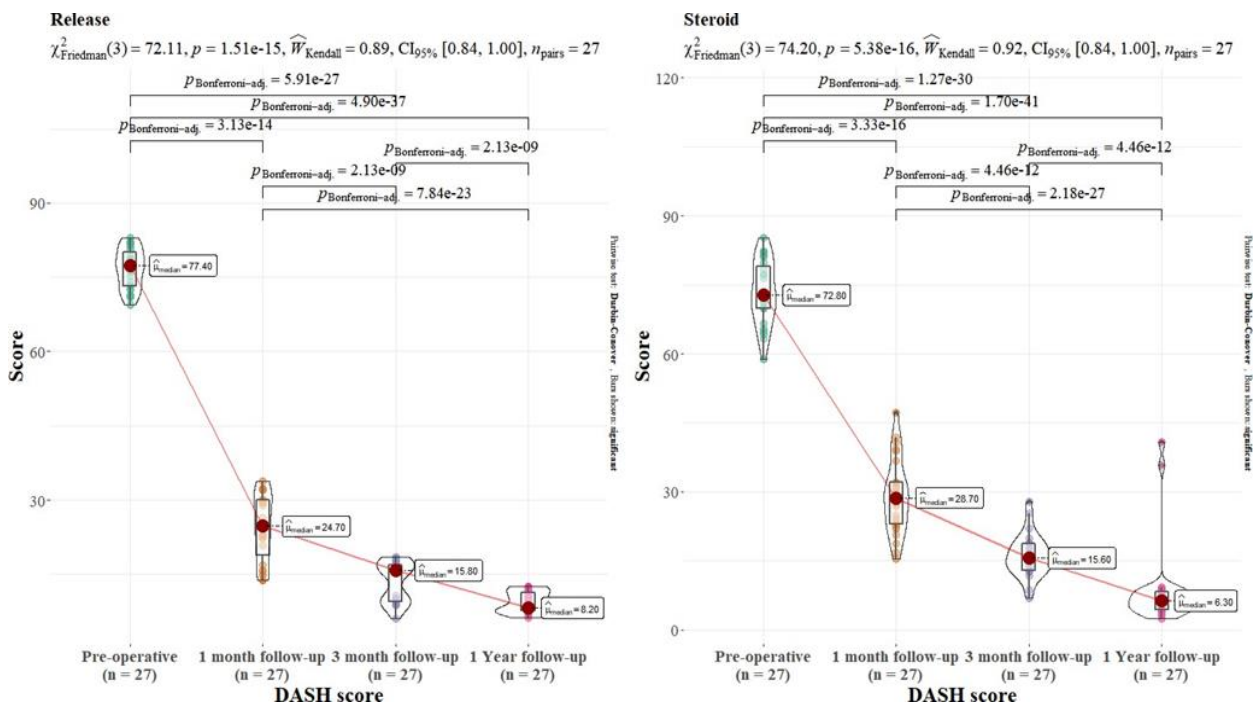


Fig. 2: Box and Violin plot of two groups showing change of VAS score over one year span

DISCUSSION

Recent studies provide substantial insights into the efficacy of release surgery versus steroid injection in the

treatment of De Quervain's tenosynovitis. Corticosteroid injections outperformed immobilization in terms of therapeutic success, with a relative risk of 1.61 [8]. In a

direct comparison, ultrasound-guided steroid injections and surgical release produced similar results, with both procedures dramatically reducing pain and function over time [6]. Surgical release remains the gold standard for symptomatic relief, especially in patients who do not respond to conservative treatment. However, steroid injections can be beneficial, with an 80% success rate after just two treatments [9]. While both treatments are viable, the choice may depend on the severity of the problem and the patient's preference, with steroid injections serving as a less invasive initial option [10,11].

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.* [12]. Omoke and Nnadozie's study included 41 DQT patients, whose ages ranged 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 [13]. 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.* [14] in which 94 of the 97 patients were female and only 3 were male. According to Stahl *et al.* research of 189 individuals, 81% of the patients were female, indicating that women are more likely than men to acquire DQT [15].

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 [16]. 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 Morshed *et al.* study out of 29 patients, 75.9% had problems with their right hand and 24.1% with their left [17]. 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.

Over four observations (baseline and follow-up at 1, 3, and 12 months) in a study, there was a statistically significant difference in the number of patients who underwent release surgery and those who received

steroid injections. At one year, steroid injection had more than four VAS scores, whereas release surgery did not exhibit a similar pattern. There was no significant difference between VAS scores at baseline and different follow-ups. Kang *et al.* conducted a study to compare the outcomes of endoscopic versus open-release techniques for the treatment of de Quervain's tenosynovitis. The researchers measured patient satisfaction using the Visual Analogue Scale (VAS) at both 12- and 24 weeks post-treatment. The results indicated that the mean VAS scar satisfaction score was significantly higher in the endoscopic group at the 24-week mark, with a p-value of less than 0.001, suggesting a strong preference for the endoscopic approach among patients [18].

Furthermore, our study found statistical differences at baseline, one-month, and three-month follow-up, but no significant change in DASH score at one-year follow-up. The mean baseline score was 75.1 ± 5.8 ; operation release had a mean of 76.8 ± 4.0 ; and steroid injection had a mean of 73.4 ± 6.9 . The DASH score showed a significant difference at baseline and one- and three-month follow-ups. In a study by Kang *et al.* the Disabilities of Arm, Shoulder, and Hand (DASH) scores were assessed at 12- and 24-weeks post-surgery. The results indicated that the DASH scores were marginally lower in the endoscopic group compared to the open group at the 12-week mark, with statistical significance noted ($p=0.012$). Similarly, at 24 weeks, the endoscopic group continued to show lower DASH scores relative to the open group, with a p-value of 0.002 [18].

In addition, Hyun-Joo Lee *et al.* conducted a retrospective study from 2003 to 2009 focusing on the surgical release of the first extensor compartment in patients suffering from refractory de Quervain's tenosynovitis. The study highlighted that intercompartmental ganglia and the separate septum of the extensor pollicis brevis are frequently associated with de Quervain's disease. The findings indicated that performing a surgical release of the first extensor compartment for patients with this condition resulted in favorable clinical outcomes, characterized by significant improvements in symptoms and functionality, while also demonstrating minimal morbidity associated with the procedure [19].

CONCLUSIONS

In conclusion, this study demonstrates that both surgical release and steroid injection are effective treatments for De Quervain's tenosynovitis, with significant improvements in pain and functionality as measured by DASH and VAS scores. While steroid injections show notable short-term benefits, surgical release provides sustained relief over time, making it a suitable option for patients with persistent symptoms. Ultimately, the choice of treatment should be tailored to individual patient needs and preferences, highlighting the importance of personalized care in managing this condition. Future research should focus on larger, multicenter trials to better assess the long-term outcomes and potential complications associated with both treatment modalities for De Quervain's tenosynovitis.

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