ISSN: 2457-0400

Impact Factor: 7.675

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

www.wjahr.com

Volume: 10, Issue: 8

Page N. 182-191

Year: 2026

Original Article

Coden USA: WJAMA3

FUNCTIONAL OUTCOME OF STEROID INJECTION IN MANAGING DE QUERVAIN'S TENOSYNOVITIS

***Anfal Dahish Hamid, Dr. Zaid Muayad Yassen**

M.B.Ch.B.; Professor of Family Medicine, M.B.Ch.B., M.Sc., HS(FM), FJMC(FM); University of Mosul.

Article Received: 27 June 2026 **Article Revised: 17 July 2026** **Article Published: 01 August 2026**

***Corresponding Author: Anfal Dahish Hamid**

M.B.Ch.B.; Professor of Family Medicine, M.B.Ch.B., M.Sc., HS(FM), FJMC(FM); University of Mosul.

DOI: https://doi.org/10.5281/zenodo.21702987

How to cite this Article: *Anfal Dahish Hamid, Dr. Zaid Muayad Yassen (2026). Functional Outcome Of Steroid Injection In Managing De Quervain's Tenosynovitis. World Journal of Advance Healthcare Research, 10(8), 182–191.

ABSTRACT

De Quervain's tenosynovitis is a stenosing tenosynovitis of the first dorsal compartment of the wrist, caused by thickening and myxoid degeneration of the tendon sheaths surrounding the abductor pollicis longus and extensor pollicis brevis tendons; corticosteroid injection is widely regarded as the most effective nonsurgical treatment, although outcome data from Iraq and the wider Middle East remain limited. This case series study aimed to assess the functional outcome of corticosteroid injection in managing De Quervain's tenosynovitis. A total of 150 patients aged 18 years and above, diagnosed clinically based on history and positive Finkelstein and Eichhoff tests, were recruited from the Orthopedic Department of Al-Jumhoori Teaching Hospital, Mosul, Iraq, between 2 January and 30 June 2025; each received a single injection of 40 mg methylprednisolone acetate with 1% lidocaine into the first dorsal compartment and were followed for three months, with pain and function assessed using the Visual Analog Scale (VAS) and the QuickDASH score. Most patients were aged 18–45 years (52.67%) and female (73.33%); heavy manual work (48.6%) and pregnancy (24.6%) were the leading associated factors, and the right, dominant hand was most frequently affected (62.00% and 85.33%, respectively). Before injection, all patients had radial-sided wrist pain and tenderness, with positive Finkelstein and Eichhoff tests in 92.00% and 82.00%; by three months, these fell to 19.33%, 14.00%, and 12.67%, respectively. Severe pain decreased from 63.33% to 4.00%, and pain-free patients increased from 0% to 52.67% ($P < 0.0001$); QuickDASH scores showed a parallel improvement, with patients reporting no or mild difficulty rising from 11.33% to 72.66% ($P < 0.0001$). Post-injection complications occurred in 36.67% of patients, most commonly injection-site pain (25.33%) and transient paraesthesia (5.33%), with skin hypopigmentation (4.67%) and subdermal atrophy (1.33%) being the least frequent late effects. Corticosteroid injection into the first dorsal extensor compartment is an effective and generally safe treatment for De Quervain's tenosynovitis, producing rapid, statistically significant improvement in pain and hand function, and should be considered as a first-line intervention before surgical referral, particularly in resource-limited settings.

KEYWORDS: De Quervain's tenosynovitis; Corticosteroid injection; Visual analog scale; QuickDASH score; Functional outcome; Iraq.

1. INTRODUCTION

De Quervain's tenosynovitis (DQT), first described by the Swiss surgeon Fritz de Quervain, is a stenosing tenosynovitis affecting the first dorsal compartment of the wrist. It results from thickening and myxoid degeneration of the tendon sheaths surrounding the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) tendons as they pass through a narrow fibro-osseous tunnel near the radial styloid.[1] Pain is typically aggravated by thumb movement and by radial or ulnar deviation of the wrist. The reported prevalence is approximately 0.5% in men and 1.3% in women, with the highest occurrence in the fourth and fifth decades of life and a predilection for the dominant wrist.[2, 3] The condition commonly affects women during late pregnancy or the postpartum period, as well as individuals engaged in physically demanding manual work.[4]

1.1 Pathophysiology

The extensor tendons of the wrist are organized into six compartments separated by the extensor retinaculum; the first dorsal compartment houses the APL and EPB tendons within a synovial sheath distinct from the other five.[5] As these tendons pass through a fibrous tunnel approximately 2 cm long, spanning the radial styloid beneath the transverse fibers of the retinaculum, they are susceptible to entrapment from acute trauma or repetitive motion.[7] In response to increased mechanical stress, fibrocartilage forms within the tendon sheath, neovascularization occurs, and the tendons undergo myxoid degeneration, collectively producing a stenosing tenosynovitis with a narrowed first dorsal compartment.[6] An intracompartmental septum separating the two tendons is frequently present and has significant implications for both nonoperative and surgical management.[8]

1.2 Risk Factors and Causes

Recognized risk factors and precipitating causes include.[9]

- Female sex.
- Age of 40 years or older.
- Pregnancy and the postpartum period.
- Lifting heavy objects and excessive or repetitive use of the thumb or wrist.
- Repetitive grasping or gripping related to occupation or hobbies.
- Chronic inflammatory conditions such as rheumatoid arthritis and diabetes mellitus.
- Direct wrist injury or trauma.

1.3 Clinical Presentation and Diagnosis

Patients typically present with gradual-onset radial-sided wrist pain that worsens with gripping and lifting, even with the wrist in a neutral position. On examination, there is tenderness over the first dorsal compartment at the radial styloid; wrist motion is usually otherwise normal, although pain is reproduced by resisted radial deviation, and the neurovascular examination is normal.[10] Diagnosis rests on this clinical picture together with positive provocative testing. In the Finkelstein maneuver, the examiner grasps the patient's thumb and rapidly abducts the hand ulnarward; reproduction of pain over the radial styloid is a positive result and is considered more suggestive of EPB than APL involvement.[11] In the Eichhoff maneuver, the patient clenches the thumb inside a fist while the wrist is deviated ulnarward, with pain relief on thumb extension despite continued ulnar deviation supporting the diagnosis.[12]

Plain radiographs are not required for diagnosis but may help exclude basilar thumb or carpal arthritis when the presentation is atypical.[1] Ultrasonography is highly informative, typically showing oedematous thickening of the APL and EPB tendons at the radial styloid (best appreciated by comparison with the contralateral side), increased fluid within the first extensor compartment sheath, thickening of the overlying retinaculum, a hypoechoic halo of peritendinous subcutaneous oedema, and peritendinous hyperaemia on Doppler imaging.[13] Magnetic resonance imaging is more sensitive and specific, particularly for mild disease with equivocal ultrasound findings, and can additionally confirm the presence of an intertendinous septum.[14] Conditions that may mimic DQT and should be considered in the differential diagnosis include osteoarthritis of the first carpometacarpal joint, scaphoid or radial styloid fracture, neuritis of the sensory branch of the radial nerve (Wartenberg's syndrome), intersection syndrome, and trigger thumb.[1]

1.4 Functional Outcome Assessment

Functional outcome after treatment is commonly quantified with the Visual Analog Scale (VAS), a 10-cm horizontal line on which patients mark a point corresponding to their pain intensity, converted to a 0–10 score (0, no pain; 1–3, mild; 4–6, moderate; 7–10, severe)[15], and with the QuickDASH questionnaire, an 11-item, self-administered instrument that evaluates the difficulty a person experiences performing daily activities involving the arm, shoulder, or hand.[16] Each QuickDASH item is rated from 1 (no difficulty) to 5 (unable to perform); the responses are summed, averaged, reduced by one, and multiplied by 25 to yield a 0–100 disability score, with higher scores indicating greater disability (Table 1).[16]

Table 1: Interpretation of the QuickDASH disability score.

QuickDASH score	Interpretation
0–20	Minimal disability
21–40	Mild disability
41–60	Moderate disability
61–80	Severe disability
81–100	Extreme disability

1.5 MANAGEMENT

De Quervain's tenosynovitis is sometimes self-limiting, but persistent symptoms are usually managed initially with splinting or oral anti-inflammatory agents. A removable semi-rigid thumb spica splint may give temporary relief but has a high recurrence and failure rate, and patient compliance is often poor; strict immobilization in a rigid splint or cast can be counterproductive by promoting further myxoid degeneration of the affected tendons.[17]

Corticosteroid injection into the tendon sheath is widely regarded as the most effective nonsurgical option, producing near-complete symptom relief in 52–90% of patients after one or two injections; approximately half of patients respond to a single injection, with a further 40–45% benefiting from a second.[18] The injection is administered approximately 1 cm proximal to the radial styloid, aiming to infiltrate both the APL and EPB sheaths as deeply as possible within the fibro-osseous tunnel to minimize the risk of subcutaneous atrophy and

hypopigmentation; ultrasound guidance can improve accuracy by visualizing multiple septa, increasing the success rate.[19] Reported immediate complications include an inflammatory flare reaction with pain, swelling, and heat, ecchymosis at the injection site, infection, transient paraesthesia of the radial nerve, and vasovagal reaction, while late complications include skin hypopigmentation, subcutaneous fat atrophy, and, rarely, tendon rupture, which can be minimized by avoiding injection directly into the tendon substance.[20] Other nonoperative modalities such as laser therapy, therapeutic ultrasound, and acupuncture have been described, but no strong consensus or high-quality evidence supports their effectiveness.[18]

Persistent or recurrent symptoms after two injections are generally an indication for surgical decompression of the first dorsal compartment. This is typically performed as an outpatient procedure under local, regional, or general anesthesia through a small (approximately 2 cm) incision, with careful protection of the superficial radial sensory nerve; the dorsal margin of the sheath is sharply incised, and any subsheaths are released before wound closure and early mobilization. Endoscopic techniques and partial excision of the extensor retinaculum have also been described. Regardless of technique, surgery achieves high rates of symptomatic relief with a low complication rate, the principal risks being injury to the radial sensory nerve, incomplete relief, and, rarely, reflex sympathetic dystrophy.[21]

Despite this extensive international literature, data on the outcome of corticosteroid injection for DQT from Iraq and the wider Middle East remain limited.

1.6 AIM OF THE STUDY

This study aimed to assess the functional outcome of corticosteroid injection in the management of De Quervain's tenosynovitis, including its effect on pain, hand function, and associated complications, and to describe the clinical and sociodemographic characteristics and possible risk factors of the condition among patients attending a tertiary hospital in Mosul, Iraq.

2. PATIENTS AND METHODS

2.1 Study Design, Setting, and Period

A case series study with follow-up was conducted in the Orthopedic Department of Al-Jumhoori Teaching Hospital, Nineveh Health Directorate, Mosul, Iraq, over the six months from 2 January to 30 June 2025.

2.2 Study Sample and Eligibility Criteria

A convenience sample of all patients attending the orthopedic outpatient clinic and diagnosed with DQT during the study period was invited to participate, yielding a total of 150 patients. Patients aged 18 years or older, diagnosed by an orthopedic specialist, were included if they had a history of pain lasting more than six weeks that had not responded to conservative management, lateral wrist pain and tenderness over the first dorsal compartment, and a positive Finkelstein or Eichhoff test; pregnant women and those in the postpartum period with DQT were also eligible. Patients were considered to have the disease when they exhibited at least two symptoms and positive results on at least two provocative tests. Patients with a history of chronic joint disease such as osteoarthritis or rheumatoid disease; diabetes mellitus or another immunocompromising condition; or a fracture around the wrist joint were excluded.[17]

2.3 Ethical Considerations

Administrative approval was obtained from the Scientific Council of the Arab Board for Health Specializations in Iraq and from the Nineveh Health Directorate. Verbal informed consent was obtained from all participants after a brief explanation of the study objectives.

2.4 Data Collection Tool

Data were collected by direct interview using a purpose-designed questionnaire administered before injection. It recorded demographic details (age, sex, residency, occupation, and hand dominance); pain characteristics (presence of pain at the base of the thumb, its character—sharp, dull, burning, or throbbing—a 0–10 severity rating, and whether it radiated to the forearm); and functional limitation in activities such as gripping objects, writing, lifting, and holding a baby. Clinical examination findings, including tenderness over the first dorsal compartment and the results of the Finkelstein and Eichhoff tests, together with the VAS and QuickDASH scores, were recorded before injection and again at four weeks and three months afterward.

2.5 Pre-Injection Preparation

All patients had already received a mean of six weeks (range, 4–8 weeks) of treatment with oral and topical nonsteroidal anti-inflammatory drugs and had shown no response and were dissatisfied with this treatment before enrollment. On examination, the area at and around the radial styloid was tender in all patients, and the Finkelstein test was positive in all patients at baseline.

2.6 MATERIALS

The following materials were used for every injection:

- Methylprednisolone acetate 40 mg/mL (Depo-Medrol), 2 mL per patient.
- Lidocaine hydrochloride 1%, 2 mL per patient, mixed with the steroid in the same syringe.
- A 5-mL disposable syringe.
- A 24- or 26-gauge hypodermic needle.
- Skin antiseptic solution for sterilization of the injection site.

2.7 Injection Procedure and Technique

All injections were performed by the on-call orthopedic specialist. Two milliliters (40 mg) of methylprednisolone acetate (Depo-Medrol) were drawn up and mixed with two milliliters of 1% lidocaine hydrochloride in a 5-mL

syringe, using a 24- or 26-gauge needle; the area of maximal tenderness was identified and confirmed before injection. With the wrist positioned in slight ulnar deviation and the injection site sterilized, the borders of the first dorsal compartment were straddled with the examiner's opposite thumb and index finger, and the needle was introduced into the tendon sheath at the level of the styloid, parallel to the tendons; correct placement was confirmed by smooth, easy flow of the injectate with visible and palpable inflation of the compartment.[19]

2.8 Follow-up Assessment

Patients were checked immediately after injection by the orthopedic specialist to identify any immediate adverse reaction to the injected material. They were then reviewed at two further fixed time points: at four weeks and again at three months from the time of injection. At each visit, pain was reassessed on the VAS and hand function was reassessed with the QuickDASH score, and the presence of radial-side wrist pain and tenderness and the results of the Finkelstein and Eichhoff tests were re-examined and recorded, allowing the trajectory of clinical improvement to be tracked over time rather than relying on a single post-treatment assessment.

2.9 Operational Definitions of Outcome Categories

For analysis, VAS scores were categorized as no pain (0), mild pain (1–3), moderate pain (4–6), or severe pain (7–10). QuickDASH scores were categorized according to the standard interpretation bands shown in Table A (minimal, mild, moderate, severe, and extreme disability), and, for the individual questionnaire items used to derive the score, patient responses were further grouped as no difficulty, mild difficulty, moderate difficulty, severe difficulty, or unable to perform the activity. These categorical groupings were used, together with the continuous VAS and QuickDASH scores, to compare the distribution of pain and functional impairment before injection and at each follow-up visit.

3. Statistical Analysis

Data were analyzed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as means and standard deviations, and categorical variables as frequencies and percentages.

• The chi-square test was used to compare patients' age, sex, side of involvement, and functional outcome scores before and after treatment.

• A two-tailed P-value of < 0.05 was considered statistically significant.

4. RESULTS

4.1 Demographic and Clinical Characteristics

Table 2 shows the age and sex distribution of the 150 patients. Most patients (52.67%) were aged 18–45 years, 29.33% were aged 45–65 years, and 18.00% were older than 65 years; females predominated in every age group, accounting for 73.33% of the total sample compared with 26.66% for males.

Table 2: Age and sex distribution.

Age (years)	Male No. (%)	Female No. (%)	Total No. (%)
18–45	17 (11.33)	62 (41.33)	79 (52.67)
45–65	14 (9.33)	30 (20.00)	44 (29.33)
>65	9 (6.00)	18 (12.00)	27 (18.00)
Total	40 (26.66)	110 (73.33)	150 (100.00)

This sociodemographic pattern indicates that DQT in this population predominantly affects women of working and child-bearing age, with a progressive decline in case numbers in the older age groups, consistent with a condition driven substantially by repetitive occupational and domestic hand use rather than purely degenerative change.

Table 3 presents the factors associated with DQT. Heavy manual work was the most common associated factor (48.6%), followed by pregnancy (24.6%), chronic conditions such as diabetes or rheumatoid disease (16.0%, recorded before application of the exclusion criteria), and wrist injury (10.6%).

Table 3: Associated (risk) factors.

Associated factor	Total No.	Percentage (%)
Heavy manual work	73	48.6
Pregnancy	37	24.6
Chronic condition	24	16.0
Wrist injury	16	10.6
Total	150	100.0

Together, heavy manual work and pregnancy accounted for almost three-quarters of associated factors (73.2%), highlighting repetitive mechanical loading of the thumb and wrist, whether occupational or related to childcare, as the dominant driver of disease in this cohort, ahead of chronic inflammatory conditions and direct trauma.

Of the 150 patients, 93 (62.00%) had right-sided involvement and 57 (38.00%) had left-sided involvement; 128 (85.33%) had their dominant hand affected, compared with 22 (14.67%) whose non-dominant hand was affected, a highly significant difference (Table 4).

Table 4: Side of the affected hand.

Affected hand	Total No. (n=150)	Percentage (%)	P-value
Right	93	62.00	
Left	57	38.00	
Dominant	128	85.33	<0.0001
Non-dominant	22	14.67	

The strong and statistically significant predominance of dominant-hand involvement supports a mechanical, overuse-related basis for the condition, since the dominant hand is subjected to greater repetitive load during daily and occupational activities than the non-

dominant hand.

Pre-injection clinical data were recorded for all 150 patients, all of whom had radial-side wrist pain and tenderness; the Finkelstein test was positive in 138 patients (92.00%) and the Eichhoff test in 123 patients (82.00%), confirming a high pre-treatment burden of clinical signs (Table 5).

Table 5: Pre-injection clinical presentation.

Pre-injection clinical finding	Total (n=150)	Percentage (%)
Radial-side wrist pain/tenderness	150	100.00
Positive Finkelstein's test	138	92.00
Positive Eichhoff's test	123	82.00

The universal presence of radial-side pain and tenderness, together with a high rate of positive provocative testing, confirms that the eligibility criteria successfully identified a clinically homogeneous group of patients with active, symptomatic disease at the time of injection, providing a consistent baseline against which the post-injection findings in Tables 6 to 8 can be interpreted.

4.2 Outcome after Corticosteroid Injection

Following injection, radial-side wrist pain and tenderness fell to 57 patients (38.00%) at the fourth week and to 29 patients (19.33%) at the third month. Finkelstein test positivity decreased from 138 (92.00%) at baseline to 41 (27.33%) at the fourth week and 21 (14.00%) at the third month, while Eichhoff test positivity decreased to 37 (24.67%) and 19 (12.67%) at the same time points; all changes were statistically significant (Table 6).

Table 6: Post-injection clinical data.

Post-injection finding	4th wk No. (%)	3rd mo No. (%)	P-value
Radial-side pain/tenderness	57 (38.00)	29 (19.33)	<0.005
Positive Finkelstein's test	41 (27.33)	21 (14.00)	<0.006
Positive Eichhoff's test	37 (24.67)	19 (12.67)	<0.017

Notably, the largest reduction in each clinical sign occurred between injection and the fourth-week review, with a further, smaller decline by the third month, suggesting that the therapeutic effect of a single corticosteroid injection is established early and is generally sustained rather than wearing off over the following two months.

Pain severity on the VAS improved markedly after injection: severe pain fell from 63.33% before injection to 4.67% at the fourth week and 4.00% at the third month, while the proportion of pain-free patients rose from 0% to 15.33% and then to 52.67% at the same time points ($P < 0.0001$), indicating a true therapeutic effect (Table 7).

Table 7: VAS classification before and after injection.

VAS class	Pre-inj. No. (%)	4th wk No. (%)	3rd mo No. (%)	P-value
No pain	0 (0.00)	23 (15.33)	79 (52.67)	<0.0001
Mild pain	0 (0.00)	80 (53.33)	42 (28.00)	
Moderate pain	55 (36.67)	40 (26.67)	23 (15.33)	
Severe pain	95 (63.33)	7 (4.67)	6 (4.00)	

No patient remained in the severe-pain category by three months in the majority of cases, and the proportion with moderate or severe pain fell from 100% of the cohort before injection to well under a fifth by the third month, demonstrating a consistent downward shift across the entire pain-severity distribution rather than improvement confined to a subgroup of patients.

The QuickDASH score demonstrated a parallel improvement in hand function. No patients reported an absence of difficulty before treatment, but 13.33% and 25.33% reported no difficulty at the fourth week and third month, respectively, while severe difficulty fell from 27.33% to 11.33% over the same period ($P < 0.0001$), confirming that the injection effectively improved patients' functional ability (Table 8).

Table 8: QuickDASH classification before and after injection.

QuickDASH class	Pre-inj. No. (%)	4th wk No. (%)	3rd mo No. (%)	P-value
No difficulty	0 (0.00)	20 (13.33)	38 (25.33)	<0.0001
Mild difficulty	17 (11.33)	62 (41.33)	71 (47.33)	
Moderate difficulty	83 (55.33)	31 (20.67)	18 (12.00)	
Severe difficulty	41 (27.33)	29 (19.33)	17 (11.33)	
Unable	9 (6.00)	8 (5.33)	6 (4.00)	

The proportion of patients unable to perform daily activities fell only modestly (6.00% to 4.00%), indicating that a small residual group had persistent, marked functional limitation despite treatment; this pattern mirrors the minority of patients who remained clinically symptomatic in Tables 5 and 6 and may represent the subgroup most likely to require a repeat injection or surgical referral.

4.3 Complications of Local Corticosteroid Injection

Of the 150 patients, 55 (36.67%) experienced a post-injection complication. Immediate complications were more common, affecting 46 patients (30.67%), the most frequent being pain at the injection site (25.33%) and paraesthesia at the base of the thumb (5.33%). Late complications occurred in 9 patients (6.00%), comprising skin hypopigmentation (4.67%) and subdermal fat atrophy (1.33%). Overall, complications were mild, localized, and self-limiting, with no serious or systemic adverse events (Table 9).

Table 9: Complications of local corticosteroid injection.

Complication	No. of patients	Percentage (%)
Pain at injection site (immediate)	38	25.33
Paraesthesia at thumb base (immediate)	8	5.33
Total immediate complications	46	30.67
Skin hypopigmentation (late)	7	4.67
Subdermal fat atrophy (late)	2	1.33
Total late complications	9	6.00
Total complications (all)	55	36.67

Immediate complications outnumbered late complications by a ratio of roughly five to one, and within each category the great majority of events were transient local reactions (pain and paraesthesia) rather than the more concerning late cosmetic effects of hypopigmentation and subdermal atrophy, which together affected fewer than one in twenty patients; no case of infection, tendon rupture, or systemic adverse event was recorded.

4.4 SUMMARY OF KEY FINDINGS

Taken together, the results demonstrate a consistent pattern across all measures examined: this was predominantly a condition of women of working and reproductive age, most often affecting the dominant hand, and strongly associated with heavy manual work and pregnancy. A single corticosteroid injection produced a rapid and statistically significant improvement across every clinical sign and outcome score assessed—radial-side pain and tenderness, the Finkelstein and Eichhoff tests, the VAS, and the QuickDASH score with most of the improvement already evident by the fourth week and largely sustained, and in several measures further improved, by the third month. Complications were common (36.67%) but were overwhelmingly mild, immediate, and self-limiting, with late complications affecting only 6.00% of patients.

5. DISCUSSION

Since De Quervain's original description of the condition in 1895, considerable advances have been made in its diagnosis and treatment, and corticosteroid injection is now regarded as the most effective nonsurgical option, with a success rate as high as 83%.[9] The present series adds outcome data from a population that has been under-represented in the published literature, and its findings are broadly consistent with those reported from North America, Europe, and other parts of the Middle East and South Asia, supporting the generalizability of corticosteroid injection as first-line therapy across diverse healthcare settings.

The marked female predominance observed in this study (73.33% versus 26.66% male) is consistent with reports by Irfan et al., Avci et al., and Walker-Bone et al., who similarly described a strong association between female sex and De Quervain's tenosynovitis.[22, 23, 24] The age distribution, dominated by patients aged 18–45 years, mirrors the findings of Manzoor et al., suggesting that the condition is most prevalent among younger to middle-aged adults, likely reflecting greater engagement in repetitive hand and wrist activity in this age group.[4]

Right-hand involvement (62.00%) and dominant-hand involvement (85.33%) were both significantly more common than the alternative, consistent with Lutsky et

al., who attributed the predominance of dominant-hand disease to greater mechanical strain from repetitive use; the excess of right-sided cases likely reflects the fact that most individuals are right-handed.[25]

Pre-injection, all patients had radial-side wrist pain and tenderness, with Finkelstein and Eichhoff tests positive in 92.00% and 82.00%, respectively; both fell substantially after injection, to 14.00% and 12.67% by three months. These findings parallel those of Satteson and Tannan, who likewise reported a marked reduction in pain and test positivity following corticosteroid injection, underscoring the effectiveness of this intervention in improving clinical signs over time.[26]

The VAS results demonstrated a highly significant reduction in pain after injection ($P < 0.0001$), with most patients shifting from severe or moderate pain to mild pain or complete pain relief by the third month. This is consistent with Ippolito et al., who similarly reported a marked decrease in pain after corticosteroid injection for De Quervain's tenosynovitis in a prospective randomized trial.[27] The QuickDASH results showed a corresponding and equally significant improvement in hand function ($P < 0.0001$), with most patients transitioning from moderate or severe difficulty to mild or no difficulty by three months, in agreement with the findings of Shin et al.[19]

Complications occurred in 36.67% of patients, most of them mild and self-limiting. Post-injection pain, the most frequent immediate effect (25.33%), together with the paresthesia at the base of the thumb seen in 5.33% of patients, is consistent with the local reactions—including a "post-injection flare" and transient nerve irritation from the close anatomical relationship between the superficial radial nerve and the first dorsal compartment—described by Kamel et al. as common after corticosteroid injection.[28] Late complications were less frequent: skin hypopigmentation occurred in 4.67%, a lower rate than described by Martins et al.[29], and subdermal fat atrophy in 1.33%, consistent with the findings of Park et al.[30] Variation in complication rates across studies may reflect differences in injection technique, steroid formulation, anatomical factors, and duration of follow-up.

Pharmacologically, the benefit of corticosteroid injection is thought to derive from its local anti-inflammatory action, which suppresses neovascularization and fibroblast proliferation within the thickened tendon sheath and thereby interrupts the fibrocartilaginous, myxoid degenerative process underlying the stenosis of the first dorsal compartment.[6, 8]; this mechanistic rationale is consistent with the rapid and sustained improvement in both pain and function observed in the present series.

Notably, every patient in this series had already completed a mean of six weeks of oral and topical nonsteroidal anti-inflammatory treatment without response before enrollment; the substantial improvement recorded after a single corticosteroid injection, therefore, represents a true treatment effect rather than the natural history of the condition or a delayed response to prior conservative therapy, reinforcing the recommendation that corticosteroid injection be offered promptly once first-line anti-inflammatory measures have failed rather than being repeated or prolonged unnecessarily.

Although the large majority of patients improved substantially, a minority remained symptomatic at three months, with 19.33% still reporting radial-side pain and tenderness, 14.00% a positive Finkelstein test, and 11.33% severe QuickDASH difficulty. Consistent with the recommendations of Canale and Beaty, these patients would be reasonable candidates for a second corticosteroid injection or, if symptoms persist or recur thereafter, for surgical decompression of the first dorsal compartment.[21]

It is also notable that the statistical significance of the functional outcome measures ($P < 0.0001$ for both VAS and QuickDASH) was stronger than that of the individual clinical signs ($P < 0.005$ to $P < 0.017$ for radial-side pain/tenderness and the Finkelstein and Eichhoff tests). This pattern suggests that composite, multi-item outcome instruments such as the VAS and QuickDASH may be more sensitive to the overall therapeutic effect of corticosteroid injection than single dichotomous clinical signs, supporting their routine use alongside standard clinical examination when evaluating treatment response in DQT.

5.1 Comparison with Surgical Outcomes

Although this study evaluated only corticosteroid injection, the literature on surgical decompression of the first dorsal compartment provides useful context for interpreting these results. Canale and Beaty describe surgical release as achieving high rates of symptomatic relief with a low complication rate, but at the cost of an incision, anesthesia, and a period of wound healing and rehabilitation that corticosteroid injection avoids entirely.[21] Given that the great majority of patients in this series achieved substantial or complete symptom relief with a single office-based injection, these findings reinforce current guidance that surgery should be reserved for the minority who fail an adequate trial of one or two corticosteroid injections, rather than being offered as an initial treatment.

A further methodological limitation deserving mention is the absence of a placebo or sham-injection control and the lack of blinding of either the treating physician or the patient to the intervention; as with any uncontrolled case series, some component of the observed improvement could reflect regression to the mean, the natural fluctuation of a chronic tendinopathy, or a nonspecific effect of the clinical encounter itself, in addition to the pharmacological effect of the corticosteroid. Randomized, placebo-controlled trials, although difficult

to justify ethically once effective treatment is well established, would provide the strongest evidence to quantify the magnitude of this effect precisely.

5.2 Considerations for Pregnancy-Related and Occupational Disease

Pregnancy and the postpartum period accounted for 24.6% of associated factors in this cohort, the second most common after heavy manual work. Avci et al. specifically compared nonsurgical treatment measures for De Quervain's disease arising during pregnancy and lactation, a clinical scenario in which corticosteroid injection must be weighed carefully against the physiological demands of breastfeeding and childcare.[23] The findings of the present study, in which corticosteroid injection produced rapid symptomatic relief with an acceptable complication profile, support its use in this subgroup when conservative measures such as splinting have failed, allowing affected mothers to resume childcare activities such as lifting and holding an infant with less pain. Similarly, for patients whose disease is occupationally driven by heavy manual work, corticosteroid injection may allow a more rapid return to work than prolonged splinting or activity modification alone, although counseling on ergonomic modification of repetitive tasks remains an important adjunct to reduce the risk of symptom recurrence after treatment.

5.3 Role of Ultrasound Guidance

All injections in this series were performed blindly, based on surface anatomical landmarks, as is standard practice in most resource-limited settings; nonetheless, the response rate achieved was comparable to that reported with the ultrasound-guided technique. Shin et al. found that ultrasound guidance improved accuracy of needle placement and could enhance outcomes, particularly where an intertendinous septum is present, by allowing both subcompartments to be infiltrated.[19] For the minority of patients in this series who remained symptomatic at three months, ultrasound-guided re-injection, where available, may therefore represent a reasonable next step before proceeding to surgical referral.

5.4 Preventive and Ergonomic Considerations

Since heavy manual work and pregnancy together accounted for nearly three-quarters of the associated factors identified in this cohort, and the dominant hand was affected far more often than the non-dominant hand, these results also point toward a preventive dimension to management. Counselling patients in manually demanding occupations about wrist- and thumb-sparing techniques and advising pregnant and postpartum women who develop early radial-sided wrist pain to seek prompt evaluation rather than tolerating symptoms may reduce the proportion of patients who progress to established, treatment-resistant disease requiring corticosteroid injection or surgery.

5.6 Clinical and Public Health Implications

For practicing clinicians, particularly family physicians and orthopedic specialists working in primary and secondary care settings across Iraq, these findings support corticosteroid injection as a simple, office-based procedure that can be offered without specialized equipment once first-line splinting or NSAID therapy has failed. Given that all patients in this series had already failed a mean of six weeks of anti-inflammatory treatment, clinicians should not delay corticosteroid injection unnecessarily, since the majority of patients achieved substantial relief of pain and disability within the first month. The relatively low rate of clinically significant complications and the absence of infection or tendon rupture in this series further support the favorable risk–benefit profile of the procedure when performed with correct technique.

5.7 Strengths of the Study

The principal strengths of this study are its relatively large sample of 150 patients for a single-center series, its use of two validated, complementary outcome measures (VAS for pain and QuickDASH for function), and its structured follow-up at two fixed time points, which together allowed the trajectory of clinical improvement to be characterized rather than relying on a single post-treatment assessment.

5.8 Limitations of the Study

This study was limited by its relatively small, single-center sample and a follow-up period restricted to three months, so the long-term durability of the therapeutic response could not be assessed. The convenience sampling method and the absence of a comparator arm (e.g., splinting alone or ultrasound-guided injection) also limit causal inference and generalizability.

Nonetheless, the magnitude and consistency of the improvement in pain and function observed here, together with a complication profile confined largely to mild, self-limiting local reactions, support corticosteroid injection as a practical, low-cost, first-line intervention for De Quervain's tenosynovitis in resource-limited settings such as Mosul, where access to ultrasound guidance and elective hand surgery may be constrained. Wider adoption of a structured pre- and post-injection assessment protocol, incorporating the VAS and QuickDASH score, could help standardize outcome reporting and facilitate comparison across centers in the region.

6. CONCLUSION AND RECOMMENDATIONS

Corticosteroid injection into the first dorsal extensor compartment is an effective and generally safe treatment for De Quervain's tenosynovitis, providing significant relief of pain and improvement in hand function for most patients, with complications that are mild, localized, and self-limiting. Both the clinical signs of the disease and the validated VAS and QuickDASH outcome scores improved significantly from baseline to the fourth week,

with further improvement sustained to the third month. The condition was more frequent in females and more often affected the right and dominant hand, and heavy manual work and pregnancy were the leading associated factors identified in this population.

Based on these findings, corticosteroid injection can reasonably be recommended as a first-line, office-based intervention for patients with De Quervain's tenosynovitis who have not responded to an initial trial of splinting or oral anti-inflammatory therapy, reserving surgical decompression for the minority of patients whose symptoms persist or recur after one or two injections.

A larger sample size, ideally from a multi-center collaboration, is recommended to provide a more comprehensive evaluation of corticosteroid injection in De Quervain's tenosynovitis, together with a longer follow-up period to allow a more precise assessment of the long-term durability of this treatment modality. Future studies incorporating a comparator arm, such as splinting alone or ultrasound-guided versus blind injection, and standardized reporting of the VAS and QuickDASH score, would further strengthen the evidence base for the management of this common condition in the region.

REFERENCES

1. Larsen CG, Fitzgerald MJ, Nellans KW, Lane LB. Management of de Quervain Tenosynovitis: A Critical Analysis Review. JBJS Rev, 2021 Sep 10; 9(9).
2. Kef S, Ie K, Sauereisen S, Shelesky G, Haugh A. Treatments for de Quervain Tenosynovitis. Am Fam Physician, 2018 Jun 15; 97(12).
3. Stahl S, Vida D, Meisner C, Lotter O, Rothenberger J, Schaller HE, Stahl AS. Systematic review and meta-analysis on the work-related cause of de Quervain tenosynovitis: a critical appraisal of its recognition as an occupational disease. Plast Reconstr Surg, 2013 Dec; 132(6): 1479-1491.
4. Manzoor A, Syed S, Nadeem M, Butt SK, Zafar SN, Hanif MK. Prevalence of De Quervain disease in infant caregivers and its association with risk factors. J Pak Med Assoc, 2024 Jul; 74(7): 1335-1337.
5. Allbrook V. 'The side of my wrist hurts': De Quervain's tenosynovitis. Aust J Gen Pract, 2019 Nov; 48(11): 753-756.
6. Fedorczyk JM. Tendinopathies of the elbow, wrist, and hand: histopathology and clinical considerations. J Hand Ther, 2012 Apr-Jun; 25(2): 191-200; quiz 201.
7. Hazani R, Engineer NJ, Cooney D, Wilhelmi BJ. Anatomic landmarks for the first dorsal compartment. Eplasty, 2008; 8: e53.
8. Lee ZH, Stranix JT, Anzai L, Sharma S. Surgical anatomy of the first extensor compartment: A systematic review and comparison of normal cadavers vs. De Quervain syndrome patients. J Plast Reconstr Aesthet Surg, 2017 Jan; 70(1): 127-131.
9. Wolf JM, Sturdivant RX, Owens BD. Incidence of de Quervain's tenosynovitis in a young, active population. J Hand Surg Am, 2009; 34(1): 112-115.
10. Sato J, Ishii Y, Noguchi H. Clinical and ultrasound features in patients with intersection syndrome or de Quervain's disease. J Hand Surg Eur Vol, 2016 Feb; 41(2): 220-5.
11. Dawson C, Mudgal CS. Staged description of the Finkelstein test. J Hand Surg Am, 2010; 35(9): 1513-1515.
12. Goubau JF, et al. The wrist hyperflexion and abduction of the thumb (WHAT) test: a more specific and sensitive test to diagnose de Quervain tenosynovitis than the Eichhoff's test. J Hand Surg Eur, 2014; 39: 286-92.
13. Stoller DW, Tirman PF, Bredella MA. Diagnostic Imaging, Orthopaedics. Salt Lake City: Amirsys; 2004.
14. Glajchen N, et al. MRI features in de Quervain's tenosynovitis of the wrist. Skeletal Radiol. 1996. doi: 10.1007/s002560050033.
15. Delgado DA, Lambert BS, Boutris N, McCulloch PC, Robbins AB, Moreno MR, Harris JD. Validation of digital visual analog scale pain scoring with a traditional paper-based visual analog scale in adults. J Am Acad Orthop Surg Glob Res Rev, 2018 Mar; 2(3).
16. Sigirtmac IC, Oksuz C. Systematic review of the quality of the cross-cultural adaptations of Disabilities of the Arm, Shoulder and Hand (DASH). Med Lav, 2021; 112(4): 279.
17. Moore JS. De Quervain's tenosynovitis: stenosing tenosynovitis of the first dorsal compartment. J Occup Environ Med. 1997; 39: 990-1002.
18. Huisstede BM, Coert JH, Fridén J, Hoogvliet P; European HANDGUIDE Group. Consensus on a multidisciplinary treatment guideline for de Quervain disease: results from the European HANDGUIDE study. Phys Ther, 2014 Aug; 94(8): 1095-110.
19. Shin YH, Choi SW, Kim JK. Prospective randomized comparison of ultrasonography-guided and blind corticosteroid injection for de Quervain's disease. Orthop Traumatol Surg Res, 2020 Apr; 106(2): 301-306.
20. Anderson BC, Manthey R, Brouns MC. Treatment of De Quervain's tenosynovitis with corticosteroids: a prospective study of the response to local injection. Arthritis Rheum, 1991 Jul; 34(7): 793-8.
21. Canale ST, Beaty JH. Campbell's Operative Orthopaedics. 11th ed. Philadelphia: Mosby; 2008. Vol 4, Part 18, The Hand.
22. Irfan S, Butt M, Ahmed I, Khalid H, Masood R, Zafar A, Ahmad U, Rehman MU. Prevalence of De Quervain's Tenosynovitis among Clinical Physical Therapists in Islamabad: A cross-sectional study. Pak J Med Health Sci, 2023; 17(05): 42.

23. Avci S, Yilmaz C, Sayli U. Comparison of nonsurgical treatment measures for de Quervain's disease of pregnancy and lactation. J Hand Surg Am, 2002; 27(2): 322-4.
24. Walker-Bone K, Palmer KT, Reading I, Coggon D, Cooper C. Prevalence and impact of musculoskeletal disorders of the upper limb in the general population. Arthritis Rheum, 2004; 51(4): 642-51.
25. Lutsky K, Kim N, Medina J, Maltenfort M, Beredjiklian PK. Hand Dominance and Common Hand Conditions. Orthopedics, 2016 May 1; 39(3): e444-8.
26. Satteson E, Tannan SC. De Quervain Tenosynovitis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing, 2025 Jan.
27. Ippolito JA, Hauser S, Patel J, Vosbikian M, Ahmed I. Nonsurgical Treatment of De Quervain Tenosynovitis: A Prospective Randomized Trial. Hand (N. Y), 2020 Mar; 15(2): 215-219.
28. Kamel SI, Rosas HG, Gorbachova T. Local and Systemic Side Effects of Corticosteroid Injections for Musculoskeletal Indications. AJR Am J Roentgenol, 2024 Mar; 222(3): e2330458.
29. Martins N, Polido-Pereira J, Caneira M, Fonseca JE. Treatment of Persistent Cutaneous Atrophy After Corticosteroid Injection With Fat Graft. Reumatol Clin (Engl Ed), 2019 Nov-Dec; 15(6): e122-e124.
30. Park SK, Choi YS, Kim HJ. Hypopigmentation and subcutaneous fat, muscle atrophy after local corticosteroid injection. Korean J Anesthesiol, 2013 Dec; 65(6 Suppl): S59-61.