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Effectiveness of single local corticosteroid injection in radial tunnel syndrome

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Abstract

Introduction: Radial tunnel syndrome (RTS) is an uncommon source of pain to the elbow and forearm often misdiagnosed as resistant tennis elbow. Corticosteroid injection is sometimes used in the management of radial tunnel syndrome, but has not been evaluated in depth.

Aim and Objective: The purpose of this study was to evaluate the utility of corticosteroid injection as a therapeutic modality for the management of radial tunnel syndrome.

Materials and Methods: We conducted this prospective study at G S medical College, Pilkhuwa, UP. The study period was from Jan 2022 to October 2022 which included follow up time of 6 months. The last case intervention was done in April 2022. A total of 30 patients (12 male and 18 female) were included with clinically diagnosed of radial tunnel syndrome.

Results: Prior to intervention the mean qDASH was 51.7 points. The mean qDASH improved over time with significant decreases to 37.2 points, $P = .03$ and 29.9 points, $P = .01$ at 3 months and 6 months follow-up respectively. The mean VAS for pain was 8.4 points prior to intervention and improved over time with significant decreases to 1.56 points, $P = .005$ and 1.7 points, $P = .003$ at 3 months and 6 months follow-up respectively. There were no complications from injection.

Conclusion: Corticosteroid injection in patients with RTS was a safe procedure that gave very good preliminary results for symptom relief.

Keywords: Radial tunnel, radial tunnel syndrome, compressive neuropathy, injection, corticosteroid

Introduction

Radial Tunnel Syndrome is a compressive neuropathy of the posterior interosseous nerve (PIN) at the level of proximal forearm (radial tunnel). It is an uncommon condition often misdiagnosed as resistant tennis elbow. Diagnosis is made clinically with pain only (maximal tenderness 3-5 cm distal to lateral epicondyle) without any motor or sensory dysfunction.

Radial tunnel syndrome (RTS) was first reported as a unique clinical syndrome in 1956.

Radial tunnel syndrome causes lateral elbow pain that is similar to tennis elbow and may sometimes occur in conjunction with that condition. Patient may typically have weakness of extension at the wrist and third digit. Clinical examination findings have overlap with tennis elbow. The most distinctive clinical finding is localisation of tenderness 3-5 cm distal to lateral epicondyle and slightly anteriorly over mobile wad^[1].

Radial Tunnel is an are about 5 cm in length from the level of the radiocapitellar joint, extending distally past the proximal edge of the supinator. Its boundaries are brachioradialis, ECRL and ECRB laterally; biceps tendon and brachialis medially; floor is formed by capsule of the radiocapitellar joint.

PIN syndrome and RTS are nerve compression syndromes affecting the PIN. Although they are characterized by distinct clinical manifestations, they result from compression at similar levels in the forearm, typically at one of the following five anatomic locations:

- Fibrous bands of tissue anterior to the radiocapitellar joint between the brachialis and brachioradialis
- Recurrent radial vessels that fan out across the PIN at the level of the radial neck as the so-called "leash of Henry"

- Leading (medial proximal) edge of the ECRB
- Proximal edge of the superficial portion of the supinator, commonly referred to as the *arcade of Frohse*
- Distal edge of the supinator muscle

Intermittent compression of the radial nerve or the deep branch in the forearm, the posterior interosseous nerve (PIN), is thought to be the pathologic basis for RTS. The supinator fascia (arcade of Frohse) is the most common cause of compression of the radial nerve. Other causes of compression of the radial nerve include prominent recurrent radial vessels, a thickened/fibrous edge of the extensor carpi radialis brevis, and schwannoma-like swelling of the radial nerve [2].

Diagnosis is based primarily on the patient's history and physical examination, as nerve conduction test and radiologic study results are typically negative [2, 3]. The diagnosis of RTS and even the existence of the phenomenon have been subjects of controversy for many years [4].

Many nonsurgical treatment of radial tunnel syndrome includes rest, NSAIDs, physiotherapy, work modifications, and corticosteroid injections [5, 6]. Surgical approaches to decompress the radial nerve have been reported, with variable success in limited case series [7].

The aim of this study was to evaluate effectiveness of local corticosteroid injection without ultrasound guidance given at point of maximum tenderness in an area over radial tunnel.

Materials and Methods

We conducted this prospective study at GS medical College, Pilkhuwa, UP from Jan 2022 to October 2022 with last injection given in April. A total of 30 patients (12 male and 18 female) were included with clinically diagnosed of radial tunnel syndrome. The mean age of enrolled patients was 28.93 (range 21 to 68) years. Right side 18 (60%) was dominant over left side 12 (40%). Among enrolled patients 3(10%) of patients also had concomitant lateral epicondylitis.

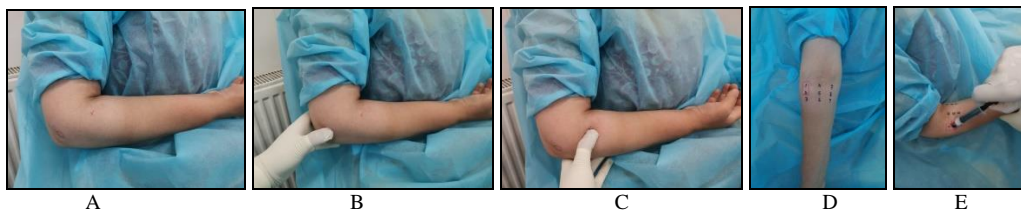


Fig 1: A: Marking of lateral epicondyle and radial tunnel area, B: Tenderness in tennis elbow, C: Palpation of tender area in radial tunnel syndrome, D: Numbering technique for localization of radial tunnel (mark 1 and 2 encircled by red denotes radial tunnel located on lateral aspect), E: Intervention

Post-intervention and follow-up

Each patient was followed up at 2 weeks, 3 months and 6 months. Improvement was documented with qDASH, VAS score and tenderness before injection and at follow-ups. Separate analyses were conducted to determine change in score over time for the entire group as well as differences in score between those with concurrent lateral epicondylitis. The results of these analyses are presented as mean differences in score with 95% confidence intervals.

Results

Among the enrolled patients the mean qDASH and VAS scores were analyzed before and post intervention and following results

Inclusion criteria

- Clinically diagnosed with radial tunnel syndrome
- Age > 18 years
- Symptom duration more than 6 months
- Failed life style modifications

Exclusion criteria

- History of elbow trauma
- Arthritis
- Fibromyalgia
- Cervical radiculopathy
- Patients with multiple sclerosis
- PIN syndrome
- History of stroke, rheumatoid arthritis, allergy to corticosteroid,
- Patients currently taking oral steroids

Patients were evaluated with VAS score for pain and tenderness before injection and at 1 month and 6 month post intervention.

Intervention

The patient was placed in the sitting position on a flat table, with the forearm flexed, in neutral rotation and arm lying close to trunk of patient. The rule of nine numbering technique was used to localise area of radial tunnel with location number 1 and 2 representing the radial tunnel area. The area of maximum tenderness was localised with palpation.

The infiltrating solution was prepared with 2 ml of 1% lignocaine and 40 mg triamcinolone. Infiltration was done at area of maximum tenderness in area numbered 1 and 2. Needle was inserted quite deep so as to reach radial tunnel and injection was done. A freehand technique was used for injection. No specific attempt was made to block the PIN. The aforementioned clinical criteria of tenderness to palpation and pain with resisted forearm supination or middle finger extension in the proximal forearm were noted to subside in all patients immediately after injection.

were obtained.

Prior to intervention the mean qDASH was 51.7 points. The mean qDASH improved over time with significant decreases to 37.2 points, $P = .03$ and 29.9 points, $P = .01$ at 3 months and 6 months follow-up respectively.

The mean VAS for pain was 8.4 points prior to intervention and improved over time with significant decreases to 1.56 points, $P = .005$ and 1.7 points, $P = .003$ at 3 months and 6 months follow-up respectively. There were no complications from injection. Post-intervention tenderness was seen in 13 patients, among which 12 shows mild tenderness and 1 patient shows moderate.

Table 1: Effect of local corticosteroid injection in radial tunnel syndrome

S. No	Sex	Age	Side	Concomitant tennis elbow	Pre-inj. Duration	Pre-inj. tenderness	Post-inj. tenderness	Pre-inj. VAS	Post injection VAS	
									3M	6M
1	F	30	R	No	6 M	Severe	Nil	9	0	1
2	F	40	R	No	13 M	Severe	Nil	8	1	1
3	M	58	R	Yes	20 M	Severe	Mild	10	3	5
4	F	25	L	No	8 M	Severe	Mild	9	3	2
5	M	30	R	Yes	12 M	Severe	Mild	9	1	2
6	M	68	L	Yes	11M	Mild	Nil	9	0	1
7	F	51	L	No	5 M	Mild	Nil	8	1	1
8	F	49	R	Yes	10M	Severe	Mild	9	2	1
9	M	25	L	Yes	7M	Mild	Nil	7	1	1
10	F	21	R	No	20M	Moderate	Mild	7	2	3
11	M	62	L	No	17M	Moderate	Mild	9	1	1
12	M	39	R	No	13M	Mild	Nil	9	2	1
13	F	25	R	No	9M	Severe	Nil	9	1	1
14	F	26	R	No	7M	Moderate	Nil	6	0	0
15	F	39	L	Yes	16M	Severe	Nil	9	2	1
16	F	32	R	Yes	11M	Severe	Nil	8	1	1
17	F	29	L	No	20M	Moderate	Mild	8	2	3
18	M	40	L	No	17M	Moderate	Nil	7	2	2
19	F	53	L	Yes	13 M	Severe	Mild	9	3	2
20	F	44	R	Yes	23M	Severe	Mild	9	1	3
21	M	47	R	No	21M	Severe	Nil	9	2	1
22	M	30	L	Yes	17M	Severe	Nil	9	2	0
23	M	54	L	Yes	12M	Severe	Mild	9	1	2
24	F	41	R	Yes	36M	Severe	Moderate	10	3	5
25	F	29	L	Yes	13M	Severe	Nil	8	3	0
26	M	38	R	No	21M	Moderate	Nil	7	1	2
27	F	31	R	No	11M	Moderate	Nil	7	0	2
28	F	37	R	No	15M	Severe	Mild	9	1	2
29	F	33	R	No	19M	Severe	Nil	8	0	1
30	M	42	R	No	24M	Severe	Mild	8	1	3

M= Month

Discussion

This study was conducted to evaluate effectiveness of corticosteroid injection in the treatment of radial tunnel syndrome. Only a few studies evaluated corticoids injections in RTS. Ritts *et al.* [8] demonstrated a good prognostic effect of radial nerve blocks in concomitant surgical treatment. Sarhadi *et al.* [9] reported on 25 patients with RTS who were treated with a single injection of 40 mg of triamcinolone in 1 mL of a carrier and 2 mL of 1% lidocaine and found that 18 patients (72%) improved at 6 weeks, whereas 16 patients (62%) continued to be pain free for 2 years. Surgical decompression was performed in 9 patients (36%) because of failed nonsurgical treatment. Another experience [10] used a single corticosteroid injection (0.25 mL of 1% lidocaine and 0.75 mL of betamethasone [Celestone; Merck & Co, Kenilworth, NJ] at 6 mg/mL) administered in the area of maximal tenderness in the forearm in 35 patients. They described a discernable effect in 57% of patients at 1 year of follow-up; 23% of patients failed to improve after injection and went to radial tunnel decompressive surgery. Almost all of these techniques emphasize infiltration of a local corticosteroid.

This study demonstrated that most patients with RTS experienced significant improvements in function and pain at 3 and 6 months compared with baseline after a single corticosteroid injection to the proximal forearm. The results obtained in present study are near about equivalent as previously done study by Sarhadi *et al.* presented their series of 25 patients with RTS who received a single injection of 2 mL of 1% lidocaine and 40 mg of triamcinolone in 1 mL of carrier and found that 18 patients (72%) had resolution of their symptoms at

6 weeks follow-up based on clinical examination findings [10]. Sixteen patients (64%) continued to have long-term pain relief at 2 years or more. Surgical decompression was performed in 9 patients (36%) due to failed nonoperative treatment. Although our study utilized different outcomes based on qDASH and VAS, we report similar rates of longterm improvement in pain and procession to surgical decompression.

There is a little knowledge about physiopathologic mechanism of RTS, it seems that an inflammatory process is only a secondary feature of the problem. It seems that repetitive pronation and supination of the forearm may cause symptoms in RTS secondary to compression-induced neuronal swelling (endoneural inflammation, edema, fibrosis, demyelination, and remyelination) [11]. The infiltration technique we describe, which uses higher volumes of a local anesthetic and corticosteroid delivered to the arcade of Frohse, is based on the need subside inflammation in relatively large area of radial tunnel.

This study has many limitations as, limited patient data were included, lack of long-term follow-up, without a control or comparative cohort, it remains unknown what proportion of improvement in function or pain might have been due to the placebo effect of injection or observation and in addition, the accuracy of needle placement within the radial tunnel was not confirmed; ultrasound guidance would be a possible addition to this technique.

However, the immediate subsidence of pain at this site in all patients with injection suggests that our injections were performed with high accuracy and reliability. Finally, we observed significant mean reductions in qDASH for patients with RTS and concomitant lateral epicondylitis or compressive

neuropathy. These coexisting pathologies have potential to confound patient reported pain and functional outcomes in the affected arm. To mitigate this effect, patients were reminded to focus their responses toward their distinct radial tunnel symptoms and nonetheless demonstrated improvement in both function and pain outcomes over time. There are several published series reporting a high cure rate with surgical decompression of the PIN in the radial tunnel, but the natural history of this condition is unknown^[9, 12, 13]. Most patients in our study responded successfully to treatment with steroid injection, and surgical decompression of the radial tunnel was performed when nonoperative treatment had failed. Based on our findings, a single corticosteroid injection can have long-lasting benefit in the treatment of RTS. Further study of corticosteroid injection for the treatment of RTS in a randomized, double blinded, placebo-controlled trial is warranted.

Conclusion

Corticosteroid injection in patients with RTS was a safe procedure that gave very good preliminary results for symptom relief. The procedure could be a diagnostic and therapeutic test, as an alternative for management of the disease before surgery.

Informed Consent: Informed consent was obtained from each patient prior to enrollment.

Conflicting Interests: No conflict of interest.

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References

1. Bolster MA, Bakker XR. Radial tunnel syndrome: emphasis on the superficial branch of the radial nerve. *J Hand Surg Eur.* 2009;34:343-347.
2. Ferdinand BD, Rosenberg ZS, Schweitzer ME, *et al.* MR imaging features of radial tunnel syndrome: initial experience. *Radiology.* 2006;240:161-168.
3. Kupfer DM, Bronson J, Lee GW, Beck J, Gillet J. Differential latency testing: a more sensitive test for radial tunnel syndrome. *J Hand Surg Am.* 1998;23:859-864.
4. Moradi A, Ebrahimzadeh MH, Jupiter JB. Radial tunnel syndrome, diagnostic and treatment dilemma. *Arch Bone Jt Surg.* 2015;3:156-162.
5. Cleary CK. Management of radial tunnel syndrome: a therapist's clinical perspective. *J Hand Ther.* 2006;19:186-191.
6. Moss SH, Switzer HE. Radial tunnel syndrome: a spectrum of clinical presentations. *J Hand Surg Am.* 1983;8:414-420.
7. Huissted B, Miedema HS, van Opstal T, de Ronde MT, Verhaar JA, Koes BW. Interventions for treating the radial tunnel syndrome: a systematic review of observational studies. *J Hand Surg Am.* 2008;33:72-78.
8. Ritts GD, Wood MB, Linscheid RL. Radial tunnel syndrome: a tenyear surgical experience. *Clin Orthop Relat Res.* 1987;219:201-205.
9. Sarhadi NS, Korday SN, Bainbridge LC. Radial tunnel syndrome: diagnosis and management. *J Hand Surg Br.* 1998;23:617-619.
10. Marchese J, Coyle K, Cote M, Wolf JM. Prospective evaluation of a single corticosteroid injection in radial tunnel syndrome [published online ahead of print July 1, 2018].
11. Kim Y, Ha DH, Lee SM. Ultrasonographic findings of posterior interosseous nerve syndrome. *Ultrasonography.* 2017;36:363-369.
12. Lister GD, Belsole RB, Kleinert HE. The radial tunnel syndrome. *J Hand Surg Am.* 1979;4:52-59.
13. Roles NC, Maudsley RH. Radial tunnel syndrome: resistant tennis elbow as a nerve entrapment. *J Bone Joint Surg Br.* 1972;54(3):499-508.

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