



A Comparative Study on Effectiveness of Local Corticosteroid Injection and Ultrasound Therapy in De Quervain's Disease

¹Dr. Sourav Dhar, DNB (PMR) , Senior Resident, Deptt. of PMR, AIIMS, Bhubaneswar, India

²Dr. Rajesh Saha, DNB (PMR) , National Institute For Locomotor Disabilities, Kolkata, India

Citation of this Article: Dr. Sourav Dhar, Dr. Rajesh Saha, “ A Comparative Study on Effectiveness of Local Corticosteroid Injection and Ultrasound Therapy in De Quervain's Disease,” IJMSAR – February – 2022, Vol. – 5, Issue - 1, P. No. 16-27.

Copyright: © 2022, Dr. Sourav Dhar, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. This allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Corresponding Author: Dr. Sourav Dhar, DNB (PMR) , National Institute For Locomotor Disabilities, Kolkata, India

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background

De Quervain's tenosynovitis is a stenosing tenosynovitis in which the tendons of abductor pollicis longus and extensor pollicis brevis are affected in the first dorsal compartment. Patients usually report with pain and swelling over the lateral side of the wrist, the base of the thumb, which occur mainly during grasping and thumb extension. The aim of my study was to compare the effectiveness of ultrasound therapy and

local corticosteroid injection in De Quervain's disease as both are easily available and cost-effective.

Objective

To compare the effects of local corticosteroid injection with ultrasound therapy in cases of de Quervain's disease.

Method

Study Area

Outpatient department in National Institute for Locomotor Disabilities in Kolkata

Study Population

The patients visiting the outpatient department were listed out as per inclusion and exclusion criteria.

Study Design and sampling technique

It is a prospective observational study over a period of 18 months. A total of 44 patients having clinically diagnosed de Quervain's tenosynovitis, on the basis of positive Finkelstein's test, WHAT test were included in this prospective study after fulfilling the inclusion criteria. The patients were selected and also assigned into two groups randomly. All the participants were evaluated with Finkelstein's test and its result on a visual analog scale, Quick-Disabilities of arm, shoulder and hand (QDASH) score, Grip strength by Jamar handheld dynamometer, Grasp, grip, pinch and gross movement test by Action Research Arm Test, after which they are advised for corticosteroid injection or ultrasound therapy randomly. A total of 7 weeks of assessment was done. Statistical Analysis was performed with help of Epi Info (TM) 7.2.2.2 EPI INFO is a trademark of the Centers for Disease Control and Prevention (CDC).

Result

At 7th week, pain reduction (assessed by VAS and QDASH), in local corticosteroid Injection group was much more compared to the ultrasound group. Both local corticosteroid Injection and ultrasound therapy

were an effective mode of treatment in De Quervain's disease. But after 7-week overall improvement in term of grip strength (assessed by Jamar Dynamometer) and grasp, grip, pinch and gross movement (assessed by ARAT kit) were better in local corticosteroid Injection group.

Conclusions

Local corticosteroid Injection group had better pain relief, more improved grip strength, pinch, grasp and gross movement as compared to ultrasound group at 7th week.

Keywords

De Quervain's disease, Corticosteroid injection, Ultrasound therapy, VAS, QDASH score, ARAT KIT, Jamar Dynamometer.

Introduction

De Quervain's tenosynovitis is a stenosing tenosynovitis in which the tendons of abductor pollicis longus and extensor pollicis brevis are affected in first dorsal compartment¹. De Quervain's disease is otherwise known as Washerwoman's sprain². It was first described by Fritz de Quervain in 1895³. It usually affects women during 30 to 55 years of age and is 10 times more commonly affected than man^{4,5}. Association of DQ is found with pregnancy, postpartum period and lactation⁶. Not associated with right or left side dominance and racial differences.

People, who are related to recreational activities including piano playing, sewing, typing, bowling, golfing, and fly-fishing and workers involved with fast repetitive manipulations such as pinching, grasping, pulling or pushing, mainly are at risk of developing de Quervain's disease⁷.

Patients usually report with pain and swelling over the lateral side of the wrist, base of the thumb, which occur mainly during grasping and thumb extension³. They may complain of pain while palpating over lateral wrist⁸. Symptoms usually last for several weeks to months and there may be a history of overuse of the wrist and the hand and onset of pain is gradual⁹. Some cases the pain is sudden onset when there is traumatic aetiology¹⁰.

Physical examination shows local tenderness and may show swelling over the radial styloid process. Finkelstein's test can be used for confirming the diagnosis¹¹. WHAT test (Wrist Hyperflexion and Abduction of Thumb) can also confirm the diagnosis of DQ¹². Detailed clinical examination of the neck and upper extremity is done before wrist examination to rule out other causes of wrist pain⁸. Diagnosis of de Quervain's disease is mainly clinical but wrist radiograph may be used to rule out other cause of wrist pain⁷. Ultrasound examination in tenosynovitis

shows hypoechoic fluid distending the tendon sheath with inflammatory changes within the tendon¹³.

Effectiveness of conservative therapy in de Quervain's disease is not clear. Modification of activity is considered most important in conservative treatment. Avoidance of highly repetitive activities like pinching or gripping may be beneficial⁵. Therapeutic lifestyle changes (TLC), Non-steroidal anti-inflammatory drug (NSAIDs), Transcutaneous electrical nerve stimulation (TENS) and ice may reduce the symptoms in DQ¹⁴. Thumb spica splint is used to give rest and immobilization of thumb as it prevents gliding of the tendon through abnormal fibro-osseous canal^{7, 15}.

Ultrasound therapy also helps in the reduction of symptoms of DQ¹⁴. The effect of ultrasound via an increase in local blood flow can be used to help reduce local swelling and chronic inflammation. The intensity of the power density of the ultrasound can be adjusted depending on the desired effect. The ultrasound waves are generated by a piezoelectric effect caused by the vibration of crystals within the head of the probe. The ultrasound waves that pass through the skin cause a vibration of the local soft tissue.

Injection of local corticosteroid into the sheath of the first dorsal compartment reduces pain

and inflammation¹⁶. A dose of 1 ml of 2 % Lidocaine and 1 ml of a long-acting corticosteroid preparation can be injected. Usually, a single injection relieves most of the symptoms. If the symptom persists, second injection can be given one month later¹⁷. Along with this, the injection of hyaluronic acid may help in reducing the recurrence rate¹⁸. Injection should not be given in tendon directly¹⁹. If we give injection under ultrasound guidance than accuracy will be more through visualization of compartmental anatomy, needle placement may improve clinical outcome by minimizing complications²⁰. Platelet-rich plasma (PRP) injections can be used if conservative management fails and it provides a regenerative stimulus for tendon healing²¹. PRP reduces pain and speeds up recovery from injury while maintaining the tissue function.

Surgical treatment indicated only when conservative treatment fails. Surgical release of the first dorsal compartment can be performed under local or regional anesthesia²². Tendons of EPB and APL are released.

The aim of my study was to compare the effectiveness of ultrasound therapy and local corticosteroid injection in DQ as both are easily available and cost-effective.

Materials and Methods

The patients visiting the outpatient department in National Institute For Locomotor Disabilities ,Kolkata listed out as per inclusion and exclusion criteria in this prospective observational study .Total 44 patients of de Quervain's disease, 22 patients in group A and 22 patients in group B. Subjects were assigned to receive either local corticosteroid injection or Ultrasound therapy and the study duration was from September 2018 to March 2020.

Inclusion Criteria

1. Clinically diagnosed de Quervain's tenosynovitis, on the basis of positive Finkelstein's test, WHAT test were included in this prospective study.
2. Both newly diagnosed cases of de Quervain's disease as well as those who have failed a course of conservative management (NSAIDs, splint) of any duration were included in the study.

Exclusion Criteria: Patients who had

1. History of cervical spondylosis with radiating pain.
2. Carpal joint arthritis.
3. Rheumatoid arthritis.
4. Any previous intervention for de Quervain's disease.
5. Intersection syndrome: This is a form of tenosynovitis in which the tendons of the first

dorsal compartment (i.e., extensor pollicis brevis, abductor pollicis longus) cross over the tendons of the second dorsal compartment (i.e., extensor carpi radialis long us, extensor carpi radialis brevis).

6. Dorsal ganglion of the wrist.
7. Fracture around the wrist.
8. Carpal tunnel syndrome.
9. Radioscaphoid arthritis.
10. Keinbock disease (osteonecrosis of lunate)
11. Pregnant or lactating mother.

Psychiatric or cognitive problems may hamper the outcome evaluation cases were selected as per inclusion and exclusion criteria. The patients who fulfilled inclusion criteria were approached with the proposal of the study. Aim of the study and procedure was explained and written consent was taken from patients, who agreed to participate. A thorough history and physical examination were done as per Study Proforma.

All the patients received standard physical and occupational interventions for the first 3 weeks after diagnosis. If any analgesics needed, acetaminophen was given. Patients were randomly divided into two groups- group A and group B. Group A patients received local

corticosteroid injection [Methylprednisolone acetate 40 mg (1 ml) and Lidocaine 2% (1mL)] and group B patients received ultrasound therapy (dose and intensity of ultrasound with duration 0.2-0.8 wt/cm² for 5 minutes, 3 MHz). Thumb spica splint was applied to both groups.

Injection site: Into the tendon sheath of the first dorsal compartment and avoided injecting directly into the tendon. The injection made at a single point immediately above the indurated tendon sheath in the first dorsal compartment. Before injection, skin hypersensitivity test was performed. If needed, a second injection was given after 4weeks.

Follow up was done on 3rd and 7th week. At each visit, the following physical signs were recorded in both groups.

- a. Finkelstein's test and its result on a visual analog scale.
- b. Quick-Disabilities of arm, shoulder and hand (QDASH) score.
- c. Grip strength by Jamar handheld dynamometer.
- d. Grasp, grip, pinch and gross movement test by Action Research ArmTest.

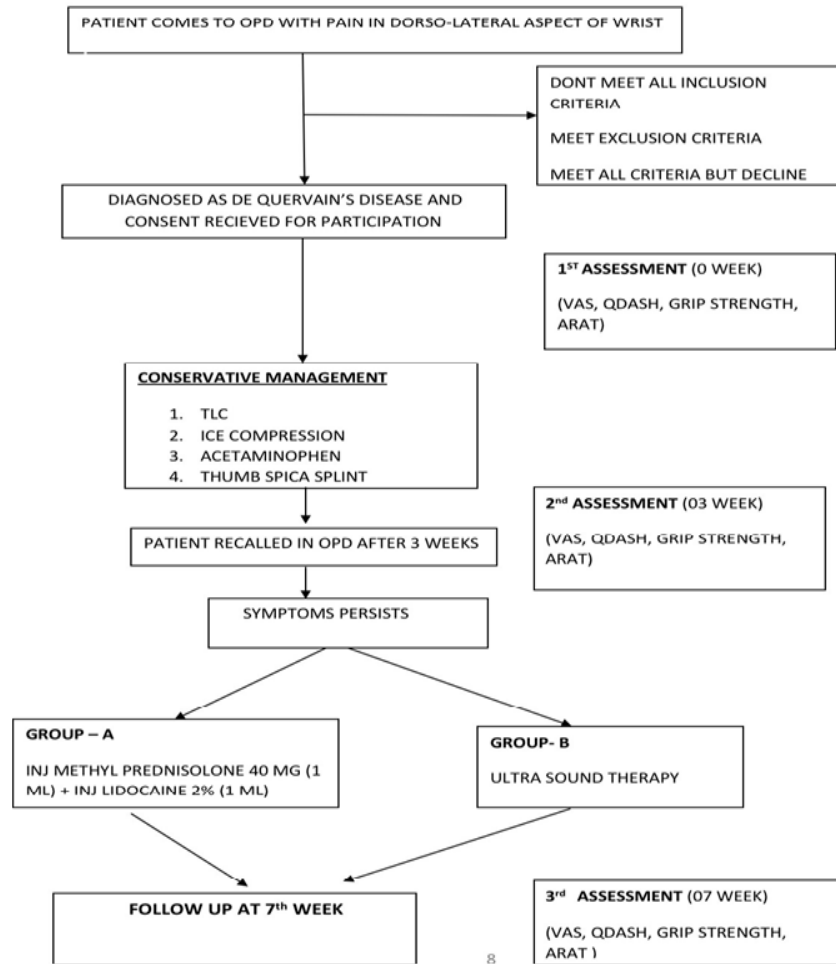


Fig: Study Technique

Results

A total of 44 patients, who came to NILD, in the outpatient department, were examined who met inclusion criteria.

Table 1: Distribution of patients according to the type of treatment

Type of treatment	Number	%
Local corticosteroid injection	22	50.0%
Ultrasound therapy	22	50.0%
Total	44	100.0%

Table 2: comparison of vas of the patients of the two groups at different time intervals

Descriptive Statistics	1st Visit	2nd Visit	3rd Visit	F-test (F _{2,63})	p-value
Local corticosteroid injection (n=22)					
Mean±s.d.	8.68±0.84	7.64±0.58	1.77±0.69	605.84	<0.0001 S
Median	9	8	2		
Range	7 - 10	7 - 9	1 - 4		
Ultrasound therapy (n=22)					
Mean±s.d.	8.50±1.01	7.55±0.60	3.95±0.79	172.98	<0.0001 S
Median	8.5	7.5	4		
Range	7 - 10	7 - 9	3 - 6		
t-test (t ₄₂)	0.64	0.51	9.81		
p-value	0.52 NS	0.61 NS	<0.0001 S		

At 3rd Visit, t-test showed that the mean VAS of the patients treated with Local corticosteroid injection was significantly lower than that of the patients treated with Ultrasound therapy(t₄₂=9.81;p<0.0001).

Table 3: Comparison of quick dash of the patients of the two groups in different time intervals

Descriptive Statistics	1st Visit	2nd Visit	3rd Visit	F-test (F _{2,)}	p-value
Local corticosteroid injection (n=22)					
Mean±s.d.	76.85±4.87	72.81±5.19	15.81±4.62	1068.62	<0.0001 S
Median	77.3	72.7	15.9		
Range	68.2 - 86.4	65.9 - 81.8	9.1 - 31.8		
Ultrasound therapy (n=22)					
Mean±s.d.	75.10±5.71	70.46±5.56	30.35±8.12	308.85	<0.0001 S
Median	75	71.6	32.95		
Range	65.9 - 86.4	59.1 - 79.5	18.2 - 45.5		
t-test (t ₄₂)	1.09	1.45	7.29		
p-value	0.28 NS	0.15 NS	<0.0001 S		

At 3rd visit, t-test showed that the mean quick dash of the patients treated with Local corticosteroid injection was significantly lower than that of the patients treated with Ultrasound therapy(t₄₂=7.29;p<0.0001).

Table 4: Comparison of Hand Grip By Jamar (in kg) of the patients of the two groups in different time interval

Descriptive Statistics	1st Visit	2nd Visit	3rd Visit	F-test (F ₂ ,)	p-value
Local corticosteroid injection (n=22)					
Mean±s.d.	21.89±6.37	24.01±6.54	33.07±7.74	16.25	<0.0001 S
Median	19.3	21.3	29.3		
Range	14.6 - 35.3	16.6 - 38.6	25.3 - 48.6		
Ultrasound therapy (n=22)					
Mean±s.d.	19.74±6.77	21.61±7.17	26.43±7.25	5.25	0.0077 S
Median	16.6	18.6	23.3		
Range	13.3 - 32.6	15.3 - 34.6	18.6 - 38.7		
t-test (t ₄₂)	1.08	1.16	2.94		
p-value	0.28 NS	0.25 NS	<0.0001 S		

At 3rd Visit, t-test showed that the mean Hand Grip By Jamar of the patients treated with Local corticosteroid injection was significantly higher than that of the patients treated with Ultrasound therapy (t₄₂=2.94; p<0.0001).

Table 5: Comparison of ARAT of the patients of the two groups at different time intervals

Descriptive Statistics	1st Visit	2nd Visit	3rd Visit	F-test (F ₂ ,)	p-value
Local corticosteroid injection (n=22)					
Mean±s.d.	54.23±1.07	54.91±0.92	56.91±0.43	59.18	<0.0001 S
Median	54	55	57		
Range	52 - 56	53 - 56	55 - 57		
Ultrasound therapy (n=22)					
Mean±s.d.	54.23±0.75	54.86±0.77	56.05±0.84	29.93	<0.0001 S
Median	54	55	56		
Range	53 - 55	53 - 56	54 - 57		
t-test (t ₄₂)	0.01	0.17	4.28		
p-value	0.99 NS	0.86 NS	<0.0001 S		

At 3rd Visit, t-test showed that the mean ARAT of the patients treated with Local corticosteroid injection was significantly higher than that of the patients treated with Ultrasound therapy ($t_{42}=4.28;p<0.0001$).

Discussion

In this comparative study done in 18 months period, a total of 44 wrists were included and examined for De Quervain's disease using the preformed format. The outcome measures of VAS, QDASH, ARAT Score were analyzed and Grip Strength by Jamar dynamometer.

In this study out of 44 patients with de Quervain's disease, 22(50.0%) of the patients were treated with local corticosteroid injection [Methylprednisolone acetate 40 mg (1 ml) and Lidocaine 2%(1 ml)] and rest 22(50.0%) of the patients were treated with ultrasound therapy (dose and intensity of ultrasound with duration 0.2-0.8 wt/cm² for 5 minutes, 3 MHz). Thus the patients of the two groups were in the ratio 1:1 (Table 1).

We found (Table 2) that in group A, the mean VAS before treatment, 1st visit (mean±s.d.) of patients was 8.68±0.84. In group B, the mean VAS before treatment, 1st visit (mean±s.d.) of the patient was 8.50±1.01. At 1st Visit, t-test showed that there was no significant difference in mean VAS of the patients treated with of the two groups ($t_{38}=0.64;p=0.52$). At 2nd visit, in group A, mean VAS (mean±s.d.) of patients was 7.64±0.58. At 2nd visit, in group B, mean VAS

(mean±s.d.) of patients was 7.55±0.60. Also, there was no significant difference in mean VAS of the patients of the two groups ($t_{42}=0.51;p=0.61$). In group A, the mean VAS after treatment 3rd visit (mean±s.d.) of patients was 1.77±0.69. In group B, the mean VAS after treatment, 3rd visit (mean±s.d.) of patients was 3.95±0.79. At 3rd Visit, t-test showed that the mean VAS of the patients treated with Local corticosteroid injection was significantly lower than that of the patients treated with Ultrasound therapy ($t_{42}=9.81;p<0.0001$).

We found (Table 3) that in group A, the mean QDASH score before treatment, 1st visit (mean±s.d.) of the patients was 76.85±4.87. In group B, the mean QDASH score before treatment, 1st visit (mean±s.d.) of patients was 75.10±5.71. At 1st Visit, t-test showed that there was no significant difference in mean Quick DASH of the patients treated with of the two groups ($t_{38}=1.09;p=0.28$). In group A, the mean QDASH score at 2nd visit (mean±s.d.) of the patients was 72.81±5.19. In group B, the mean QDASH score at 2nd visit (mean±s.d.) of patients were 70.46±5.56. There was no significant difference in mean Quick DASH of the patients of the two groups ($t_{42}=1.45;p=0.15$) at 2nd visit. In group A, the mean QDASH score, in 3rd visit (mean±s.d.) of the patients were 15.81±4.62. In group

B, the mean QDASH score at 3rd visit (mean±s.d.) of patients were 30.35±8.12. At 3rd Visit, t-test showed that the mean Quick DASH of the patients treated with Local corticosteroid injection was significantly lower than that of the patients treated with Ultrasound therapy ($t_{42}=7.29$; $p<0.0001$).

We found (Table 4) than in group A, mean grip strength by Jamar (in Kg) before treatment, 1st visit (mean±s.d.) of the patients was 21.89±6.37. In the group, B mean grip strength by Jamar (in Kg) before treatment, 1st visit (mean±s.d.) of the patients was 19.74±6.77. At 1st Visit, t-test showed that there was no significant difference in mean Hand Grip By Jamar of the patients treated with of the two groups ($t_{38}=1.08$; $p=0.28$). In group A, mean grip strength by Jamar (in Kg), 2nd visit (mean±s.d.) of the patients were 24.01±6.54. In group B, mean grip strength by Jamar (in Kg), 2nd visit (mean±s.d.) of the patients were 21.61±7.17. There was no significant difference in mean hand grip by Jamar of the patients of the two groups ($t_{42}=1.16$; $p=0.25$) at 2nd visit. In group A, mean grip strength by Jamar (in Kg), 3rd visit (mean±s.d.) of the patients were 33.07±7.74. In group B, mean grip strength by Jamar (in Kg), 3rd visit (mean±s.d.) of the patients were 26.43±7.25. At 3rd Visit, t-test showed that the mean Hand Grip By

Jamar of the patients treated with Local corticosteroid injection was

Significantly higher than that of the patients treated with Ultrasound therapy ($t_{42}=2.94$; $p<0.0001$).

We found (Table 5) that in group A, the mean ARAT score, before treatment, 1st visit (mean±s.d.) of the patients were 54.23±1.07. In group B, the mean ARAT score, before treatment, 1st visit (mean±s.d.) of the patients were 54.23±0.75. At 1st Visit, t-test showed that there was no significant difference in mean ARAT of the patients treated with of the two groups ($t_{38}=0.01$; $p=0.99$). In group A, the mean ARAT score, 2nd visit (mean±s.d.) of the patients were 54.91±0.92. In group B, the mean ARAT score, 2nd visit (mean±s.d.) of the patients were 54.86±0.77. There was no significant difference in mean ARAT of the patients of the two groups ($t_{42}=0.17$; $p=0.86$) at 2nd visit. In group A, the mean ARAT score, 3rd visit (mean±s.d.) of the patients were 56.91±0.43. In group B, the mean ARAT score, 3rd visit (mean±s.d.) of the patients were 56.05±0.84. At 3rd Visit, t-test showed that the mean ARAT of the patients treated with Local corticosteroid injection was significantly higher than that of the patients treated with Ultrasound therapy ($t_{42}=4.28$; $p<0.0001$).

Conclusion

At 7th week, pain reduction (assessed by VAS and QDASH), in local corticosteroid Injection group was much more compared to the ultrasound group. Both local corticosteroid Injection and ultrasound therapy were an effective mode of treatment in De Quervain's disease. But after 7-week overall improvement in terms of grip strength (assessed by Jamar Dynamometer) and grasp, grip, pinch and gross movement (assessed by ARAT kit) were better in local corticosteroid Injection group.

References

1. Leslie WD .The scintigraphic appearance of de Quervain's tenosynovitis. Clin Nucl Med. 2006;31:602- 604
2. Alberton GM, High WA, Shin AY, Bishop AT. Extensor triggering in de Quervain's stenosing tenosynovitis. J Hand Surg Am .1999; 24: 1311 - 1314.
3. Ahuja NK, Chung KC, MD Quervain (1868-1940): stenosing tendovaginitis at the radial styloid process. J Hand Surg Am .2002; 29: 1164 – 1170
4. Stern PJ.Tendinitis ,overuse syndrome , and tendon injuries .Hand Clin . 1990 ; 6 (3) : 467 - 476.
5. Hartwell SW, Larsen RD , Posch JL. Tenosynovitis in women in industry. Cleve Clin.1964; 31:115- 118.
6. Adams JE, Habib R. Tendinopathies of the hand and wrist .J Am Acad orthop Surg. 2015; 23 :741 - 750 .
7. Moore JS.de Quervain's tenosynovitis. Stenosing tenosynovitis of the first dorsal compartment. J occupy Environ Med 1997; 39(10):990-1002.
8. Forman TA, Forman SK, Rose NE. A clinical approach to diagnosing wrist pain. Am fam Physician 2005; 72:1753-1758.
9. Abe Y, Taiwan K, Nagano E .Extensor pollicis longus tenosynovitis mimicking de Quervain's disease because of its course through the first extensor compartment: a report of 2 cases. J Hand Surg Am .2004; 29:225 -229.
10. Wright PE II. Carpal tunnel, ulnar tunnel, and stenosing tenosynovitis. In: Campbell WC, canale ST, beauty JH, eds. Campbell's Operative Orthopaedics.11th ed. Philadelphia, PA: Mosby/Elsevier;2008: 4299 – 4230.
11. Alexander RD, Catalano LW, Barron OA, Glickel SZ. The extensor pollicis brevis entrapment test in the treatment of de Quervain's disease. J Hand Surg Am. 2002; 27:813–816.
12. Goubau JF, Goubau L, Van Tongel A, Van Hoonacker P, Kerckhove D, Berghs B. 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 Surgeur Vol.* 2014 Mar. 39(3):286-92.
13. Torriani M, Kattapuram SV. Musculoskeletal ultrasound: an alternative imaging modality for sports-related injuries. *top tan reason Imaging.* 2003;14:103–111.
14. Walker MJ. Manual physical therapy examination and intervention of a patient with radial wrist pain: a case report. *J srthop sports phys ther* 1994; 34:761-769.
15. Lane LB, Boretz RS, Stuchin SA. Treatment of de Quervain's disease: role of conservative management. *J Hand Surg Br* 2001; 26:258-260.
16. Stephens MB, Beutler AI, O'Connor FG. Musculoskeletal injections: a review of the evidence. *Am Fam Physician.* 2008 Oct 15. 78(8):971-6.
17. Sawaizumi T, Nanno M, Ito H. De Quervain's disease: efficacy of intra-sheath triamcinolone injection. *int orthop.* 2007 Apr. 31(2):265-8.
18. Orlandi D, Corazza A, Fabbro E, Ferrero G, Sabino G, serafini G, et al. Ultrasound- guided percutaneous injection to treat de Quervain's disease using three different techniques: a randomized controlled trial. *Eu Radial.* 2015 May. 25 (5):1512-9
19. Tallia AF, Cardone DA. Diagnostic and therapeutic injection of the wrist and hand region. *Am Fam Physician* 2003;67:745-750
20. Mcdermott J.D., Ilyas A. M., Nazarian L.N. and Leinberry C. F.: Ultrasound-guided injections for de Quervain's tenosynovitis. *Clin. Orthop. Relat. Res.,* 470 (7): 1925-1931, 2012.
21. Filardo G., Di Mattel b., Kon E., Merli G .And Marcacci M.: Platelet-rich plasma in tendon-related disorders: Results and indications. *Knee surgery Sports Trau-matol. Arthrosc,* 26: 1984, 2018.
22. Scheller A, Schuh R, Honle W, Schuh A. Long-term results of surgical release of de Quervain's stenosing tenosynovitis. *Int Orthop.* 2009 Oct. 33 (5):1301-3.