ORIGINAL ARTICLE

Efficacy of intralesional injection of platelet rich plasma in patients of De Quervain's tenosynovitis

Rehan Wani, Umbreen Aslam, Rabnawaz Khan, Muhammad Uzair Naru, Ashfaq Ahmed, Rizwan Akram, Amer Aziz

Abstract

Introduction: De Quervain's tenosynovitis is a disorder of the tendons of the first dorsal compartment of the wrist that causes pain and functional disability, which may be refractory to conservative treatments. Platelet-rich plasma (PRP) has become increasingly popular in sports Medicine and Orthopaedic practice as treatment for muscle, tendon, and ligament injuries, and has received media attention because of its promise as a regenerative therapy.

Objective: To determine the efficacy of intralesional injection of platelet rich plasma (PRP) in patients of De Quervain's tenosynovitis

Material & Methods: This descriptive series were conducted at Department of Orthopedics and Spine centre, Ghurki Trust Teaching Hospital, Lahore Pakistan from January 2018 to July 2019. Total 100 patients fulfilling the inclusion criteria were included in the study. Platelet rich plasma was obtained after centrifuging the blood taken from the patient. Under aseptic measures a phlebotomist obtained blood in vacutainer. Vacutainer was centrifuged and middle zone containing platelet rich plasma was aspirated in a 5 ml disposable syringe. The patient received intralesional injection plus oral non-steroidal anti-inflammatory drug.

The included patients were evaluated three weeks after treatment initiation for pain relief. Time of start of symptoms for more than one year and history of diabetes was treated as effect modifier along with age and gender.

Results: Mean age of patients was 41.26±11.26 years. There were 53(53%) patients in the study who were diabetic. Efficacy of treatment was seen in 85(85%) patients. However in 15(15%) patients Intralesional injection of platelet rich plasma was not effective. Efficacy of treatment was not significantly associated with age, gender, diabetes status and duration of symptoms.

Conclusion: Keeping in mind the results of this study and as well as the results of pilot study conducted prior to this study intralesional injection of platelet rich plasma can be effectively used for de Quervain's tenosynovitis. However further studies are needed to put this treatment modality in the first line treatment options for patients with de Quervain's tenosynovitis

Keywords: Efficacy, Intralesional, Injection, Platelet rich plasma, De Quervain's tenosynovitis

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Ghurki Trust Teaching Hospital, Lahore
R Wani
U Aslam
R Khan
MU Naru
I Ahmad
R Akram
A Aziz

Correspondence:
Dr Ashfaq Ahmed
Department of Orthopaedics and Spine Centre, Ghurki Trust Teaching Hosptial, Lahore
Address:
Cell No:+92 333-9881342
email: ashfaqjadoon40@yahoo.com

Introduction:

De Quervain's tenosynovitis refers to entrapment tendonitis/tenosynovitis of the abductor pollicis longus and extensor pollicis brevis tendons at the styloid process of the radius.[1-3]

It is most often a cumulative movement disorder due to chronic over use of the wrist and hand. Bilateral or unilateral tenosynovitis may also accompany pregnancy, direct trauma, and systemic diseases such as rheumatoid arthritis and calcium apatite deposition disease. It affects two thumb tendons: the Abductor Pollicis Longus (APL) and the Extensor Pollicis Brevis (EPB).

These tendons are responsible for extending the

thumb backwards and for moving the thumb away from the palm of the hand. These tendons connect their respective muscles in the forearm to the thumb. On their way to the thumb, the Abductor Pollicis Longus (APL) and Extensor Pollicis Brevis (EPB) traverse side-by-side through a thick fibrous sheath that forms a tunnel at the radial styloid process.[1-4]

Platelet-rich plasma (PRP) is autologous blood centrifuged to produce a smaller volume of more concentrated platelets. Prior studies have shown success when using PRP to treat tendinopathy, including Achilles tendinopathy, elbow epicondyle tendinopathy, patellar tendinopathy, and rotator cuff tendinopathy.[5-7]

Tissue repair processes are mediated and controlled by a wide range of growth factors and cytokines, many found in platelets. PRPs (derived from centrifuged autologous whole blood) are used as concentrated source of growth factors. Preparation is injected into or around injured tendon. After activation, platelets release many growth factors, including platelet-derived growth factor, transforming growth factor β, and epidermal growth factor, which may aid in tissue regeneration. The growth factors stimulate a cascade to recruit reparative cells while also inhibiting apoptosis and metalloproteinase activity.[3,5,7]

In a recent case presentation, platelet-rich plasma injection has been found successful in treatment of de Quervain's tenosynovitis.[3]

We conducted a pilot study on 15 patients of De-quervain tenosynovitis out of which efficacy was found in 11-patients i.e. 73.3% (in terms of VAS score < 3).

The rationale of our study was that there is no local and international study available reporting the efficacy of intra-lesion injection platelet rich plasma. In our clinical practice tenosynovitis is empirically treated with different sorts of available treatment e.g. steroids, oral anti-inflammatory drugs etc. Current study will generate an evidence regarding efficacy of intralesional injection of platelet rich plasma so we may avoid the side effects of therapeutic drugs.

Material and methods:

This descriptive case series was conducted at Department of Orthopedics and Spine centre, Ghurki Trust Teaching Hospital from January 2018 to July 2019 after approval from Hospital ethical committee and written informed consent of the patients. A Sample size of 100 cases is calculated with 95% confidence level, 9% margin of error and taking expected percentage of efficacy i.e. 73.3% of intralesional platelet rich plasma injection in patients of de-quervain tenosynovitis. Patients of either sex between age 20 – 60 years, Newly diagnosed cases having history of symptoms for more than equal to 1 year of De Quervain's tenosynovitis determined by history and positive Finkelstein test (as per operational definition) and having VAS score > 7 were included in the study while patients having previous surgery or intervention for De Quervain's tenosynovitis. Any history of connective tissue disorders, previous fracture of ipsilateral humerus, rheumatoid arthritis and osteoarthritis of shoulder or any history road traffic accident involving upper limbs and shoulders and pregnant females assessed on history were excluded from the study.

After an informed consent patients presenting to out-patient Department of Orthopaedics fulfilling the inclusion criteria were included in the study. Platelet rich plasma was obtained after centrifuging the blood taken from the patient. Under aseptic measures a phlebotomist obtained blood in vacutainer. Vacutainer was centrifuged and middle zone containing platelet rich plasma was aspirated in a 5 ml disposable syringe. The patient received intralesional injection plus oral non-steroidal anti-inflammatory drug (Naproxen 500 mg twice daily). A questionnaire (attached as appendix I) containing background information i.e. age, sex, time of start of symptoms, efficacy and history of diabetes was used as research instrument. The included patients were evaluated three weeks after treatment initiation for pain relief and all the information was recorded in same structured questionnaire. Researcher himself complete

Table 1: *Pain status of patients*

Pain (VAS)	Base Line	After Treatment
None	0(0%)	21(21%)
Mild	0(0%)	64(64%)
Moderate	0(0%)	15(15%)
Severe	100(100%)	0(0%)
Total	100	100%

Table 2: *Efficacy of Intralesional injection of platelet rich plasma in terms of patient's age*

	Efficacy		
Age groups	Yes	No	Total
20-30	16(18.8%)	4(26.7%)	20
31-40	27(31.8%)	2(13.3%)	29
41-50	23(27.1%)	3(20%)	26
>50	19(22.4%)	6(40%)	25
Total	85	15	100

Chi-Square Test= 3.71 p-value= 0.294

Table 3: *Efficacy of Intralesional injection of platelet rich plasma in terms of patient's gender*

	Efficacy		
Age groups	Yes	No	Total
Male	49(57.6%)	8(53.3%)	57
Female	36(42.4%)	7(46.7%)	43
Total	85	15	100

Chi-Square Test= 0.097 p-value= 0.756

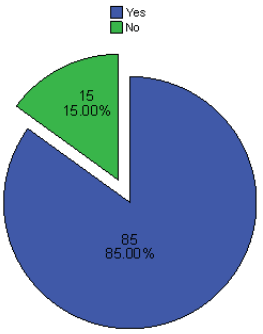

Figure 1: Efficacy of Intralesional injection of platelet rich plasma

the proforma to reduce bias. Time of start of symptoms for more than one year and history of diabetes was treated as effect modifier along with age and gender. Data collected was entered and analyzed in the SPSS version 17. Mean with standard deviation was calculated for quantitative variables like age as frequency and percentages in case of categorical variables like gender and efficacy in terms of pain relief. Pain relief was assessed on visual analogue scale. Proportions of subjects with pain relief was compared using chi square. P ≤0.05 was taken as statistical significance. Data was stratified for age, gender and time of start of symptoms, and history of diabetes to treat effect modifiers. Post-stratification, chi-square test was applied to check the significance with p-value≤0.05 as significant.

Results:

The mean age of patients was 41.26±11.26 years with minimum and maximum age of patients was 20 and 60 years while gender distribution of patients showed that there were 57 male and 43 female patients.

Among all patients there were 53(53%) patients in the study who were diabetic. Mean time of start of symptoms of patients was 2.73±1.34 years. Minimum and maximum time of start of symptoms was 1 and 5 years respectively. Before treatment all patients had severe pain. After treatment 21(21%) patients had no pain, 64 (64%) had mild and 15(15%) patients had moderate pain according to Visual Analogue Scoring system. (table-1)

Efficacy of treatment was seen in 85(85%) patients. However in 15(15%) patients Intralesional injection of platelet rich plasma was not effective. (figure-1) Patients who were relived after intralesional injection of platelet rich plasma among them 16(18.8%) were in the age group 20-30 years, 27(31.8%) were in the age group 31-40, 23(27.1%) were in the age group 41-50 years and 19(22.4%) patients were >50 years. As per this trend no statistically significant association was seen between age of patients and efficacy of intralesional injection of platelet rich plasma. i.e. (p-value=0.294)(table-2)

Patients who had relief after Intralesional injection of platelet rich plasma among them 49(57.6%) were male and 36(42.4%) were female patients. No statistically significant association was seen between gender of patients and efficacy of intralesional injection of platelet rich plasma. i.e. (p-value=0.756)(table-3)

Among 85 patients who were relived after intralesional injection of platelet rich plasma among

Table 4: *Efficacy of Intralesional injection of platelet rich plasma in terms of patient's diabetes status*

	Efficacy		
Age Groups	Yes	No	Total
Yes	44(51.8%)	9(60%)	53
No	41(48.2%)	6(40%)	47
Total	85	15	100

Chi-Square Test= 0.347 p-value= 0.556

Table 5: *Efficacy of Intralesional injection of platelet rich plasma in terms of duration of start of symptoms*

	Efficacy		
Age Groups	Yes	No	Total
1-2	40(47.1%)	7(46.7%)	47
3-5	45(52.9%)	8(53.3%)	53
Total	85	15	100

Chi-Square Test= 0.001 p-value= 0.978

them 44(51.8%) were diabetic and 41(48.2%) were non diabetic. Efficacy of Intralesional injection of platelet rich plasma was not dependent on the diabetic status of the patients. i.e. (p-value=0.556)(table-4)

Patients who were relieved from intralesional injection of platelet rich plasma among them 40(47.1%) patient duration of disease was in between 1-2 years and 45(52.9%) patients duration of disease in between 3-5 years. However efficacy of intralesional injection of platelet rich plasma was not dependent on duration of start of symptoms of patients. i.e. (p-value=0.978) (table-5)

Discussion:

De Quervain's Tenosynovitis is a condition characterized by thickening of and by the accumulation of mucopolysaccharide in the sheath of the abductor pollicis longus and extensor pollicis brevis tendons, which cross under the extensor retinaculum in the first dorsal compartment of the wrist.[8]

The extensor retinaculum is a fibrous band attached to the underlying radius which prevents bow stringing of the extensor tendons off the dorsum of the wrist. The condition takes its name from the Swiss physician de Quervain who first described a case series of five patients in 1895. Prevalence is estimated at 0.5% among men and 1.3% among women.[9]

Non-surgical modalities are the first line of treatment and include rest, ice, non-steroidal anti-inflammatory drugs, therapeutic exercise and splinting. Corticosteroid injection is then the mainstay of treatment for those patients who do not respond to the above. Other described treatments include: acupuncture, ozone oxygen and hyaluronic acid injections, ultrasound-guided percutaneous needle tenotomy and PRP injection, and prolotherapy. Surgery is reserved for failure of conservative modalities and involves release of the first dorsal compartment.[3,10-12]

PRP is autologous blood centrifuged to produce a smaller volume of more concentrated platelets. Prior studies have shown success when using PRP to treat tendinopathies, including Achilles tendinopathy, elbow epicondylar tendinopathy, patellar tendinopathy, rotator cuff tendinopathy, and others. [3,10-12]

However, there are only a few randomized controlled studies with the use of PRP, and its efficacy is still debated.[13,14] To our knowledge, PRP injection for the treatment of de Quervain's tenosynovitis has not been reported in the literature. Only one case presentation was published by Evan Peck in which he used ultrasound guided percutaneous needle tenotomy and PRP injection for treating de Quervain's tenosynovitis.[3]

In this study efficacy of intralesional injection of PRP was seen in 85(85%) patients who had de-quervain's tenosynovitis. As no local study is available in which use of intralesional injection of platelet rich plasma was done for treating de-quervain's tenosynovitis.

However as just to test the effectiveness of intralesional injection of platelet rich plasma a pilot study was conducted. As per findings of pilot study on 15-patients of De-Quervain's tenosynovitis out of which efficacy was found in 11 patients i.e. 73.3% (in terms of VAS score < 3). However these results showed that intralesional

injection of platelet rich plasma can be effectively used for treating De-Quervain's tenosynovitis.

Evan Peck[3] in his case presentation reported that their patient did not respond to a 3-months period of standard conservative care but responded well to US guided Percutaneous Needle Tenotomy (PNT) and Platelet Rich Plasma (PRP) injection, with pain relief lasting at least 6 months after the procedure.

She experienced relief of pain in her left hand and was able to avoid surgical intervention. Specifically, the patient's VAS score dropped 63% from before the procedure to 6 months after the procedure. In addition, there were no complications associated with the procedure.

Factors such as non-compliance with post procedural instructions, the physical therapy program, or instructions to avoid NSAIDs during the pre-procedure and post-procedure periods could potentially affect the clinical results of this procedure.[3]

Platelet Rich Plasma (PRP) was first used clinically in maxillofacial and plastic surgery in the 1990s. Its use in Orthopedics and sports medicine began in the early 2000s, initially in spinal fusion augmentation and fracture healing.[15] In recent years, its use has been expanded to the treatment of tendinopathies, with some favorable results reported in the literature for Achilles tendinopathy, elbow epicondylar tendinopathy, patellar tendinopathy, rotator cuff tendinopathy, and other tendons.[16-21]

However, other studies have not shown a favorable result relative to control treatments or the injection of autologous blood, and further research is needed to confirm its efficacy.[22-24]

After activation, platelets release many growth factors, including platelet-derived growth factor, transforming growth factor, and epidermal growth factor, which may aid in tissue regeneration.[25]

The growth factors stimulate a cascade to recruit reparative cells while also inhibiting apoptosis and metalloproteinase activity. The restoration of tendon tissue may result in a decrease of pain and an improvement of function.[16-21,25]

Based on the reported success of PRP injections for the treatment of certain tendinopathies, it may potentially be successful for the treatment of other tendinopathies, including De Quervain's teno-synovitis. For patients with De Quervain's tenosynovitis to conservative care, results of this study advocate that intralesional injection of PRP may be a reasonable option to consider before surgery.

Conclusion:
The results of our study and as well as the results of pilot study conducted prior to this study intralesional injection of platelet rich plasma can be effectively used for De Quervain's tenosynovitis. However further studies are needed to put this treatment modality in the first line treatment options for patients with De Quervain's tenosynovitis

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Role and contribution of authors:
Dr Rehan Wani, collected the data, references and did the initial writeup.

Dr Umbreen Aslam, collected the data and helped in introduction writing.

Dr Rabnawaz Khan, collected the references and helped in discussion writing.

Dr Muhammad Uzair Naru, collected the data and helped in result writing

Dr Ashfaq Ahmed, collected the data and helped in discussion writing.

Dr Ijaz Ahmad, collected the references and helped in discussion writing and compiling the result

Dr Rizwan Akram, collected the data, references

and helped in discussion and result writing.

Prof Amer Aziz, critically review the article and made final change

References:

1. Harwood P, Giannoudis P. De Quervain's Tenosynovitis. In: Giannoudis PV, editor. Practical Procedures in Orthopedic Surgery: Springer London; 2012. p. 19-20.
2. Mehdinasab SA, Alemohammad SA. Methylprednisolone acetate injection plus casting versus casting alone for the treatment of de Quervain's tenosynovitis. Archives of Iranian medicine 2010 Jul;13(4):270-4.
3. Peck E, Ely E. Successful treatment of de Quervain tenosynovitis with ultrasound-guided percutaneous needle tenotomy and platelet-rich plasma injection: a case presentation. PM&R 2013;5(5):438-41.
4. Pagonis T, Ditsios K, Toli P, Givissis P, Christodoulou A. Improved corticosteroid treatment of recalcitrant de Quervain tenosynovitis with a novel 4-point injection technique. The American journal of sports medicine 2011;39(2):398-403.
5. Bittencourt C, Bittencourt P, Neto O, Arenas G. The Use of Platelet-Rich Plasma in Orthopaedic Injuries. Platelet-Rich Plasma: Springer; 2014. p. 289-313.
6. Mautner K, Malanga G, Colberg R. Optimization of ingredients, procedures and rehabilitation for platelet-rich plasma injections for chronic tendinopathy. Pain management 2011;1(6):523-32.
7. Mishra A, Randelli P, Barr C, Talamonti T, Ragone V, Cabitza P. Platelet-Rich Plasma and the Upper Extremity. Hand Clinics 2012 11//;28(4):481-91.
8. Ilyas AM. Nonsurgical treatment for de Quervain's tenosynovitis. The Journal of hand surgery 2009;34(5):928-9.
9. 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 Care & Research 2004;51(4):642-51.
10. Moretti M. Effectiveness of Oxygen-Ozone and Hyaluronic Acid Injections in De Quervain's Syndrome. International Journal of Ozone Therapy 2012;11(1).
11. Tseng V, Ibrahim V, Yokel NR. Poster 251 Prolotherapy for DeQuervain's Tenosynovitis/Tendonosis: A Case Report. PM&R 2012;4(10):S275.
12. Hall MP, Band PA, Meislin RJ, Jazrawi LM, Cardone DA. Platelet-rich Plasma: Current Concepts and Application in Sports Medicine. Journal of the American Academy of Orthopaedic Surgeons 2009;17(10):602-8.
13. Richie III CA, Briner WW. Corticosteroid injection for treatment of de Quervain's tenosynovitis: a pooled quantitative literature evaluation. The Journal of the American Board of Family Practice 2003;16(2):102-6.
14. Peters-Veluthamaningal C, Van der Windt D, Winters JC, Meyboom-de Jong B. Corticosteroid injection for de Quervain's tenosynovitis. Cochrane Database Syst Rev 2009;3.
15. Jo CH, Kim JE, Yoon KS, Lee JH, Kang SB, Lee JH, et al. Does platelet-rich plasma accelerate recovery after rotator cuff repair? A prospective cohort study. The American journal of sports medicine 2011;39(10):2082-90.
16. Filardo G, Kon E, Della Villa S, Vincentelli F, Fornasari PM, Marcacci M. Use of platelet-rich plasma for the treatment of refractory jumper's knee. International orthopaedics 2010;34(6):909-15.
17. Finnoff JT, Fowler SP, Lai JK, Santrach PJ, Willis EA, Sayeed YA, et al. Treatment of chronic tendinopathy with ultrasound-guided needle tenotomy and platelet-rich plasma injection. PM&R 2011;3(10):900-11.
18. Gaweda K, Tarczynska M, Krzyzanowski W. Treatment of Achilles tendinopathy with platelet-rich plasma. Int J Sports Med 2010;31(8):577-83.
19. Kon E, Filardo G, Delcogliano M, Presti ML, Russo A, Bondi A, et al. Platelet-rich plasma: new clinical application: a pilot study for treatment of jumper's knee. Injury 2009;40(6):598-603.
20. Mishra A, Pavelko T. Treatment of chronic elbow tendinosis with buffered platelet-rich plasma. The American journal of sports medicine 2006;34(11):1774-8.
21. Creaney L, Wallace A, Curtis M, Connell D. Growth factor-based therapies provide additional benefit beyond physical therapy in resistant elbow tendinopathy: a prospective, single-blind, randomised trial of autologous blood injections versus platelet-rich plasma injections. British journal of sports medicine 2011:bjsports82503.
22. de Vos RJ, Weir A, van Schie HT, Bierma-Zeinstra SM, Verhaar JA, Weinans H, et al. Platelet-rich plasma injection for chronic Achilles tendinopathy: a randomized controlled trial. Jama 2010;303(2):144-9.
23. Thanasas C, Papadimitriou G, Charalambidis C, Paraskevopoulos I, Papanikolaou A. Platelet-rich plasma versus autologous whole blood for the treatment of chronic lateral elbow epicondylitis a randomized controlled clinical trial. The American journal of sports medicine 2011;39(10):2130-4.
24. Rha D-w, Park G-Y, Kim Y-K, Kim MT, Lee SC. Comparison of the therapeutic effects of ultrasound-guided platelet-rich plasma injection and dry needling in rotator cuff disease: a randomized controlled trial. Clinical rehabilitation 2013;27(2):113-22.
25. Mishra A, Woodall J, Vieira A. Treatment of tendon and muscle using platelet-rich plasma. Clinics in sports medicine 2009;28(1):113-25.