GAVIN PUBLISHERS

Journal of Orthopedic Research and Therapy

Mohaghegh S, et al. J Orthop Ther: JORT-174.

Research Article

DOI: 10.29011/2575-8241. 000074

Comparative Evaluation of Platelet Rich Plasma(PRP) and Corticosteroid Injection in Chronic Rotator Cuff Tendinopathy

Shahram Mohaghegh[1*], Mohammad Mahdi Emam[2], Latif Gachkar[3]

[1]Department of Sports and Exercise Medicine, Clinical Research Development Centre of Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[2]Department of Rheumatology, Rheumatology, Loghman Hakim hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[3]Department of infectious and tropical diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[*]**Corresponding author:** Shahram Mohaghegh, Department of Sports and Exercise Medicine, Loghman Hospital, Shahid Beheshti University of Medical sciences, Tehran, Iran. Tel: +98-2155419005, +98-9123040965; Email: sh.mohaghegh@sbmu.ac.ir

Citation: Mohaghegh S, Emam MM, Gachkar L (2017) Comparative Evaluation of Platelet Rich Plasma(PRP) and Corticosteroid Injection in Chronic Rotator Cuff Tendinopathy. J Orthop Ther: JORT-174. DOI: 10.29011/2575-8241. 000074

Received Date: 20 December, 2017; **Accepted Date:** 26 December, 2017; **Published Date:** 02 January, 2018

Abstract

Introduction: Ascommonly used subacromial corticosteroid injection for treatment of chronic rotator cuff tendinopathy has adverse effects especially in elderly people, new treatment options such as Platelet-Rich Plasma (PRP) can be considered for managing of this pathology.

Method: In a randomized clinical trial,35 patients with MRI -confirmed chronic rotator cuff tendinopathy who had more than 40 years old, were treated with one subacromial injection of Platelet-Rich Plasma (PRP) (17 patients) or corticosteroid (18 patients). All patients were assessed before,1, 3 and 6 months after injection for painrelief and improvement ofshoulder range of motion, strength and function.

Results: Both injection groups showed statistically significant improvements in mentioned outcome measures compared with those before injection. There were not statistically significant differences between two groups in the outcome measuresat the times of the assessments.

Conclusion: It may be reasonable to use subacromial PRP injection in patients with more than 40 years old instead of corticosteroid injection in chronic rotator cuff tendinopathy because of lack of known sever adverse effects of PRP in these groups of patients and potential risk of complications of corticosteroid injection especially for the elderly. Level of evidence 2

Introduction

Soft tissue lesions of shoulder including rotator cuff tendinopathy are common causes of shoulder pain and disability [1]. Rotator cuff tendinopathy, associated with supraspinatus partial thickness tendon tears constitutes more than 50 % of patients with shoulder pains [2]. Tendinopathy is a general term describing painful conditions of tendons secondary to overuse [3]. Tendon it is refers to existence of an inflammatory process in tendons. However, several studies have shown that actually there is little or no inflammatory process in overuse injuries of tendons [4-6]. Tendons are relatively avascular, and their regenerations are limited [7]. As many treatments of rotator cuff tendinopathy are unyielding and rehabilitation time can be long-lasting, new treatment options targeting the inflammatory process such as Platelet-Rich Plasma (PRP) can be considered for managing of this pathology [8].

PRP injection can deliver the needed cellular and humeral mediators for healing cascade. Platelet granules as a rich source of growth factors can provide supra-physiological levels of these factors at injury site [9]. It has been shown that use of autologous platelets can help to revascularize the tendon injury site and accelerate its healing and ameliorate pain and functional

limitations in rotator cuff pathologies [10-13]. Although, the effect of PRP injections on rotator cufftears has been investigated and compared with cortisone injection in 2 recent studies from Europe [14] and Egypt [10], we did not have access to the results of these studies at the time of writing of our research proposal .Also, to our knowledge, the effect of PRP injections on chronic rotator cuff tendinopathy as compared to standard injection therapy with corticosteroid has not been investigated in patients with more than 40 years old yet. Therefore, the aim of this study was comparative evaluation of PRP and corticosteroid injections in chronic rotator cuff tendinopathy in sample of Iranian patients with more than 40 years old.

Materials and Methods

In a randomized clinical trial ,35 patients (20 women and 15 men, mean age 47±4 years) who had referred to the University Hospital loghman in Tehran between 2015 to 2017were registered in our study. Patients were included if they were ≥40 years, had persistent shoulder pain for at least 3 months, had 3 positive shoulder physical examination tests (among 4 tests including Neer ,Hawk in ,Speed and Job tests) and confirmed rotator cuff tendinopathy by Magnetic Resonance Imaging (MRI).Patients were excluded if they were diabetic, pregnant, anemic(hemoglobin less than 11mg/dl), thrombocytopenic(platelet count less than 150000 per micro liter). Also patients who had complete rupture of rotator cuff tendons in MRI, reported radicular pain, had other inflammatory conditions such as Rheumatoid arthritis,Fibromyalgia and Polymyalgia rheumatica, suffered from other shoulder pathologies such as frozen shoulder, had previous shoulder dislocation or joint laxity or used other physical therapy modalities or local corticosteroid injection in previous 3 months or NSAID drugs in last week before injection(PRP or corticosteroid)were ruled out.A written consent form was completed and signed by all the included patients .The research was approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, and conducted in accordance with the principles of the Declaration of Helsinki. Patients were followed in 1,3 and 6 months for assessment of their pain [by Visual Analogue Scale(VAS)], active shoulder range of motion (by goniometer), functional abilities [by WORC (Western Ontario Rotator Cuff) and DASH (the Disabilities of the Arm, Shoulder and Hand) questionnaires] and force of muscles (by manual testing). Both questionnaires have been translated to Persian and validated in Iranian Patients with shoulder pain [15,16].

All injections were performed by the first author into subacromial space via posterolateral direction. Using aseptic technique, the needle is inserted just inferior to the posterolateral edge of the acromion and directed toward the opposite nipple [17]. For all patients, after injection, the arm sling was used for 24 hours and then shoulder range of motion exercises started as tolerated. Other physical therapy modalities were not used after injection. The patients were allowed to use 500 mg Acetaminophen tablet every 6 hours for their pain control. NSAIDs were not allowed for 6 months after injection. In the PRP group, using Standard kit (Arjangian), 8.5 ml of blood was taken from the antecubital vein andsubsequently 1.5 mL of acid citrate dextrose solution was added to the sample as an anticoagulant. The blood sample was then centrifuged for 15 minutes at 1400 rpm resulting in three layers: the lower layer made up of red blood cells, the intermediate layer is composed of white blood cells and buffy coat, and the upper layer is composed of plasma. The buffy coat layer and the plasma layer were later collected and centrifuged for another 7 minutes at 2800 rpm in order to concentrate platelets. Finally, 2 to 3 ml of PRP was collected. Local anaesthetic agent was not injected with PRP. The patients were injected just once by 25 gauges,1.5inches needle. In the corticosteroid group, patients received a corticosteroid injection [80 mg triamcinolone acetonide, suspension(Depo-Medrol) plus 2cc lidocaine 2%] by means of a 5-ml syringe and 25 gauges,1.5 inches needle. Independent-sample two-tailed t tests were used to analyse mean differences of outcome measures between PRP and corticosteroid groups. The significance level was set at 0.05. Statistical analysis was done using SPSS 16 software and related tests.

Results

In following (Table 1).

	Male	Female	Mean Age(SD)
PRP	7	10	48(7) years
Corticosteroid	8	10	46(5) years

Table 1: The basic data of participants in two groups are presented.

All patients in both groups had statistically significant better functional, shoulder range of motion and strength scores and pain relief in VAS after injection in 1,3 and 6 months compared to baseline. (Paired T test with p value less than 0.01). There were not statistically significant differences in improvements of mean functional, shoulder range of motion and strength scores and pain relief in VAS in 1,3 and 6 months between PRP and corticosteroid group (P value more than 0.05).

Discussion

According to data of present study, although there were statistically significant better functional, shoulder range of motion and strength scores and pain relief after injection of PRP or corticosteroid, there were not statistically significant differences in improvement between two groups in mentioned outcome measures in 1,3 and 6 months. In several studies, it has been shown that PRP injection can improve pain, function and MRI outcomes in patients with rotator cuff tendinopathy [18-20]. It has been shown that platelet concentrates contain factors such as transforming growth factors, and fibroblast growth factors which can promote tendon cell proliferation, collagen synthesis and vascularisation *in vitro* and *in vivo* [21-23]. Also, PRP and other growth factor containing biologicals have been usedin addition to rotator cuff tear surgery with some positive effects [24,25]. Complications of PRP injections in musculoskeletal conditions are rare and include local infection and pain at the site of injection [26]. On the contrary, Kesikburun et al [27], have not found any difference between injecting PRP or saline for treatment of rotator cuff

tendinopathy or partial tendon ruptures at a 1-year follow-up [27]. Also, some authors have not found any beneficial effect using PRP during shoulder surgery [28,29]. Although local corticosteroid injection has been a proven therapeutic tool for short term pain relief in shoulder tendinopathies, the potential adverse effects of corticosteroid injections especially for the old patients, should also be taken into account [30]. Local corticosteroid injection can weaken the injected tendon and may make it more prone to rupture by changing the collagen fascicles [31]. In two recent studies, the effect of PRP injections on rotator cuff tears has been investigated and compared with cortisone injection in 6weeks, 12 weeks and 6 months after injection. Authors of these studies have concluded that compared with cortisone injections, PRP injections show earlier benefit although a statistically significant difference after 6 months could not be found. It seems that the above differences between results of mentioned studies with current study are due to methodological variations in these studies including number of patents, patient selection, randomization, PRP preparation, platelet concentrations in injected liquids, and number of injection. For example, if we used 3 sequential injection of PRP instead of 1 injection as used in Von Wehren et al study [14], it might be possible that our outcome measures became different. Or lack of significant differences in results between our groups may be due to small number of our participants.

Our study had some limitations. First the small number of patients which was due to narrow inclusion criteria and lack of cooperation of patients in follow ups. Second, we could not do ultrasound guided injections and platelet count measurements of PRP samples due to lack of facilities. Third we could not follow patients for more than 6 months. Further studies with a larger number of patients, more extended follow ups and more controlled conditions are needed.

Conclusion

Although we could not find any significant differences between PRP versus corticosteroid injection in terms of pain relief, shoulder range of motion, strength and function improvements, it may be reasonable to use PRP injection in patients with more than 40 years old instead of corticosteroid injection in chronic rotator cuff tendinopathy because of lack of known severe adverse effects of PRP in these group of patients and potential risk of complications of corticosteroid injection especially for the elderly.

References

1. Lewis JS (2010) Rotator cuff tendinopathy: a model for the continuum of pathology and related anagement. Br J Sports Med 44: 918-923.

2. Kim HM, Dahiya N, Teefey SA, Middleton WD, Stobbs G, et al. (2010) Location and initiation of degenerative rotator cuff tears. J Bone Joint Surg (Am) 92: 1088-1096.

3. Andres BM and Murrell GAC (2008) Treatment of Tendinopathy: What Works, What Does Not, and What is on the Horizon. Clinical Orthopaedics and Related Research 466: 1539-1554.

4. Khan KM, Cook JL, Bonar F, Harcourt P, Astrom M (1999) Histopathology of common tendinopathies. Update and implications for clinical management. Sports Med 27: 393-408.

5. Ljung BO, Forsgren S, Friden J (1999) Substance P and calcitonin gene-related peptide expression at the extensor carpi radialis brevis muscle origin: implications for the etiology of tennis elbow. J Orthop Res 17: 554-559.

6. oslowsky LJ, Thomopoulos S, Tun S, Flanagan CL, Keefer CC, et al. (2000) Neer Award 1999. Overuse activity injures the supraspinatus tendon in an animal model: a histologic and biomechanical study. J Shoulder Elbow Surg 9: 79-84.

7. Ho JO, Sawadkar P, Mudera V (2014) A review on the use of cell therapy in the treatment of tendon disease and injuries. J Tissue Eng 18: 2041731414549678.

8. Shams A, El-Sayed M, Gamal O, Ewes W (2016) Subacromial injection of autologousplatelet-rich plasma versus corticosteroid for the treatment of symptomatic partial rotator cuff tears. Eur J Orthop Surg Traumatol 26: 837-842.

9. Rutgers M, Saris DB, Dhert WJ, Creemers LB (2010) Cytokine profile of autologous conditioned serum for treatment of osteoarthritis, in vitro effects on cartilage metabolism and intra-articular levels after injection. Arthritis Res Ther 12: R114.

10. Shams A, El-Sayed M, Gamal O, Ewes W (2016) Subacromial injection of autologous platelet-rich plasma versus corticosteroid for the treatment of symptomaticpartial rotator cuff tears. Eur J Orthop SurgT raumatol 26: 837-842.

11. Anitua E, Andı´a I, Sanchez M, Azofra J, del Mar Zalduendo M, et al. (2005) Autologous preparations rich in growth factors promote proliferation and induce VEGF and HGF production by human tendon cells in culture. J Orthop Res 23: 281-286.

12. Randelli P, Arrigoni P, Ragone V, Aliprandi A, Cabitza P (2011) Platelet rich plasma in arthroscopic rotator cuff repair: a prospective RCT study, 2-year follow-up. J Shoulder Elbow Surg 20: 518-528.

13. Peerbooms JC, Sluimer J, Bruijn DJ, Gosens T (2010) Positive effect of an autologous platelet concentrate in lateral epicondylitisin a double-blind randomized controlled trial: platelet rich plasma versus corticosteroid injection with a 1-year follow up.Am J Sports Med 38: 255-262.

14. von Wehren L, Blanke F, Todorov A, Heisterbach P, Sailer J, et al. (2016) The effect of subacromial injections of autologous conditioned plasma versus cortisone for the treatment of symptomatic partial rotator cuff tears. Knee Surg Sports TraumatolArthrosc 24: 3787-3792.

15. Mousavi SJ, Hadian MR, Abedi M, Montazeri A (2009) Translation and validation studyof the Persian version of the Western Ontario Rotator Cuff Index. Clin Rheumatol 28: 293-299.

16. Mousavi SJ, Parnianpour M, Abedi M, Askary-Ashtiani A, Karimi A, et al. (2008) Cultural adaptation and validation of the Persian version of the Disabilities of the Arm, Shoulder and Hand (DASH) outcome measure. Clin Rehabil 22: 749-57.

17. Tallia AF and Cardone DA (2003) Diagnostic and therapeutic injection of the shoulder region. Am Fam Physician 67: 1271-1278.

18. Nguyen RT, Borg-Stein J, McInnis K (2011) Applications of platelet-rich plasma in musculoskeletal and sports medicine: anevidence-based approach. PM R 3: 226-250.

19. Cook JL and Purdam CR (2009) Is tendon pathology a continuum? A pathology model to explain the clinical presentation of load induced tendinopathy. Br J Sports Med 43: 409-416.

20. Rha DW, Park GY, Kim YK, Kim MT, Lee SC (2013) Comparison of the therapeutic effects of ultrasound-guided platelet-richplasma injection and dry needling in rotator cuff disease: a randomized controlled trial. Clin Rehabil 27: 113-122.

21. Bosch G, Moleman M, Barneveld A, van Weeren PR, vanSchieHT (2011) The effect of platelet-rich plasma on the neovascularizationof surgically created equine superficial digital flexor tendon lesions. Sc and J Med Sci Sports 21: 554-561.

22. Schnabel LV, Mohammed HO, Miller BJ, McDermott WG, Jacobson MS, et al. (2007) Platelet-rich plasma (PRP) enhances anabolic gene expression patternsin flexor digitorumsuperficialis tendons. J Orthop Res 25: 230-240.

23. Heisterbach PE, Todorov A, Fluckiger R, Evans CH, MajewskiM (2012) Effect of BMP-12, TGF-beta1 and autologousconditioned serum on growth factor expression in Achillestendon healing. Knee Surg Sports TraumatolArthrosc 20: 1907-1914.

24. Jo CH, Shin JS, Lee YG, Shin WH, Kim H, et al. (2013) Platelet-rich plasma for arthroscopic repair of large to massive rotator cuff tears: a randomized, single-blind, parallel-group trial. Am J Sports Med 41: 2240-2248.

25. Gumina S, Campagna V, Ferrazza G, Giannicola G, Fratalocchi F, et al. (2012) Use of platelet leukocyte membrane in arthroscopic repair of large rotator cuff tears: a prospective randomized study. J Bone Joint Surg Am 94: 1345-1352.

26. Mishra A, Woodall J Jr, Vieira A (2009) Treatment of tendon and muscle using platelet-rich plasma. Clin Sports Med. 2009 Jan 28: 113-25.

27. Kesikburun S, Tan AK, Yilmaz B, Yasar E, Yazicioglu K (2013) Platelet-rich plasma injections in the treatment of chronic rotator cuff tendinopathy: a randomized controlled trial with 1-year follow-up. Am J Sports Med 41: 2609-2616.

28. Antuna S, Barco R, Martinez Diez JM, Sanchez Marquez JM (2013) Platelet-rich fibrin in arthroscopic repair of massive rotatorcuff tears: a prospective randomized pilot clinical trial. Acta Orthop Belg 79:25-30.

29. Bergeson AG, Tashjian RZ, Greis PE, Crim J, Stoddard GJ, et al. (2012) Effects of platelet-rich fibrin matrix onrepair integrity of at-risk rotator cuff tears. Am J Sports Med 40: 286-293.

30. Zheng XQ, Li K, Wei YD, Tie HT, Yi XY, et al. (2014) Nonsteroidal anti-inflammatory drugs versus corticosteroid for treatmentof shoulder pain: a systematic review and meta-analysis. Arch Phys Med Rehabil 95: 1824-1831.

31. Haraldsson BT, Langberg H, Aagaard P, Zuurmond AM, van El B, et al. (2006) Corticosteroids reduce the tensile strength of isolated collagen fascicles. Am J Sports Med 34: 1992-1997.