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Clinical Outcome of Autologus PRP In Rotator Cuff Injury - A Prospective Study (30 Cases)

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Abstract

Background: Rotator cuff injury has been considered a major cause of shoulder pain and disability.

Aim: To study the Role of autologous PRP (Platelet rich plasma) in Rotator Cuff Injury.

Methods: A prospective study was conducted on 30 patients in department of orthopedics at tertiary care hospital.

Results: Patient's ages ranged from 20 to 80 with mean ± SD (42.13± 13.03) years. 46.67% had injury due to weight lifting, 23.33% had RTA, presented with pain as chief complaint. SPADI score before PRP was 80.23±10.69 whereas 12.96 ±4.65 after PRP. ($p<0.0001$*). 90% cases were cured. 6.67% patient had pain in neck and 3.33% had fever as adverse effect of injection. 73.33% had excellent SPADI score after PRP whereas 16.66% had good score and 10% had poor SPADI score.

Conclusion: Our study shows injection of PRP resulted in a safe, significant, sustained improvement in pain and functional outcomes for patients with partial Rotator Cuff Tear (RCT).

Keywords: PRP, Rotator cuff injury, SPADI index.

Introduction

Rotator cuff injury has been considered a major cause of shoulder pain and disability that is increasing substantially with age affecting more than half of the general population by the age of 60 years.[1]The supraspinatus muscle is the most injured in rotator cuff injury, and most of the time, it is accompanied with another rotator cuff muscle injury.[2]

The management of rotator cuff injury nowadays includes oral drugs (like NSAIDs), local injections with corticosteroids, and physical therapy or lastly surgical repair depending on the type and extent of the injury, yet it is associated with a high risk of infection and damage to surrounding nerves and blood vessels with up to 6 months of recovery period.

Recently, there are numerous well documented studies about using blood and its products to facilitate the

healing course and augmenting musculoskeletal repair.8 The basic science of platelet rich plasma mainly depends on the growth factors in the alpha-granules. PDGF, TGF-BETA 1, EGF, and VEGF are the growth factors seen in platelet granules. These growth factors have effect on the healing process of many tissues. PGDF is platelet derived growth factor. It is found in alpha granules of platelets. PGDF has mytogenic potential for both mesenchymal and osteoblast cells. PGF is epidermal growth factor which also has mitogenic activity and it will stimulate and regulate collagen synthesis. FGF-fibroblast growth factor, TGF-beta transforming growth factor beta, IGF-insulin like growth factor, VEGF vascular endothelial growth factor and CTGF-connective tissue growth factor have similar potential activities depending upon which tissue they were acting. It is these growth factors which platelet rich plasma a potential substance for regeneration and differentiation of tissues and its use in treatment of various conditions.

Method

This prospective, observational study was carried out in the department of Orthopaedics and Trauma centre, Sardar Patel Medical College, Bikaner. Under this prospective study, thirty (30) patients were considered who were undergone the procedure. The total follow-up period was 6 months.

Inclusion criteria

Primary, traumatic, or degenerative partial rotator cuff tears of less than 50% thickness in MRI within 18 months of initial diagnosis, Patients complaining of shoulder pain in age group between 18-80 years, Symptoms have been continuous for more than 3 months and failed conservative treatment of at least 4 weeks of formal medical and physical therapy and Patient who gives consent for study.

Exclusion criteria

Full-thickness rotator cuff tear, Steroid injection in the past 6 months in the injured shoulder, Bleeding disorders or preoperative platelet count less than 1,50,000, Presence of another disease that may cause shoulder pain and dysfunction as rheumatoid arthritis and osteo-arthritis, Prior surgery to the injured shoulder, Current treatment with anticoagulation, and Prior PRP treatment to the injured shoulder.

After taking detailed history including gender, age, laterality, history of occupation requiring shoulder overuse and night pain, history of bleeding disorder, history of prior surgeries or steroid injections. Explaining the whole procedure including the steps, outcomes, and complications, written consents was taken from the patients according to ethical committee considerations. Patients were evaluated clinically using the Shoulder Pain and Disability Index scoring system (**SPADI**) at prior to PRP injection and after 6 months post procedure.

Procedure

Pre-procedure instructions: Patients who had scheduled an injection should stop all anti-inflammatory medications for 1 week prior to injection.

Preparation of PRP

PRP was prepared by withdrawing peripheral blood, which was centrifuged to obtain a highly concentrated sample of platelets. The platelets undergo degranulation to release growth factors with healing properties. Plasma contains cytokines, thrombin, and other GFs, with inherent biological and adhesive properties.

The most basic method to prepare PRP is centrifugation divided into a one step and two step centrifugation protocol. The effect of separation by these two methods is still controversial. The increase in commercial applications led to the development of PRP kits. Whether PRP is prepared by manual centrifugation or by use of

kits platelet concentration is significantly higher than in whole blood.

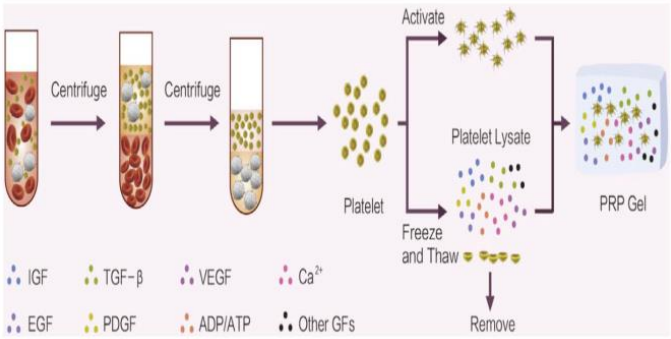


Fig. 1: Diagram showing two-step centrifugation protocol for preparation of PRP

The first centrifugation separates out the red blood cells and the second centrifugation to concentrate the platelets. Growth factors were released from platelet products.

Method of preparation of PRP

The PRP was prepared by the Multi-Disciplinary Research Unit, Sardar Patel Medical College and Associated Group of Hospitals, Bikaner (Raj) India.

About 40 cc of blood was collected from anti-cubital vein under aseptic conditions into four 10 cc ACD containing vaccutaner tubes; All tubes were placed in centrifuge machine in such a way that each of them is counter balanced by another.

First Spin: After placing the tubes in centrifuge machine they were centrifuged at speed of 1800 rpm for 5 minutes.

Blood in all four tubes had separated into 3 layers after first spin.

A. The bottom layer comprising of RBC's,
B. Middle layer of buffy coat (leucocytes with platelets)
C. Top layer of plasma with suspended platelets.

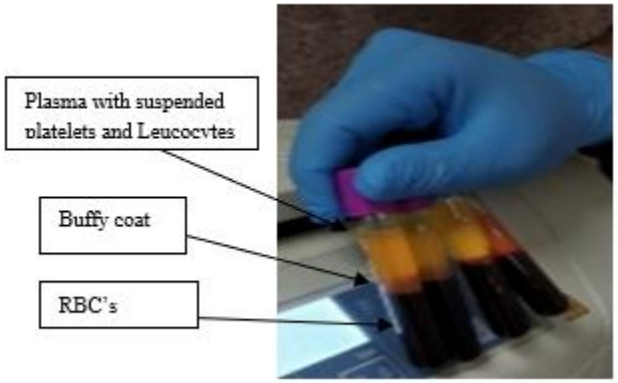


Fig. 2: Blood stratification after First spin

With the help of Micropipette, the serum and the buffy coat (leucocytes and platelets) was drawn from the each tubes into another 10 cc tube. Thus, total 20 cc of plasma is obtained; which is divided into two tubes of 10 cc each. These two tubes were modified and capped to fit into the centrifuge machine.

Second Spin: After placing the tubes in centrifuge machine; were centrifuged at speed of 4500 rpm for 10 minutes.

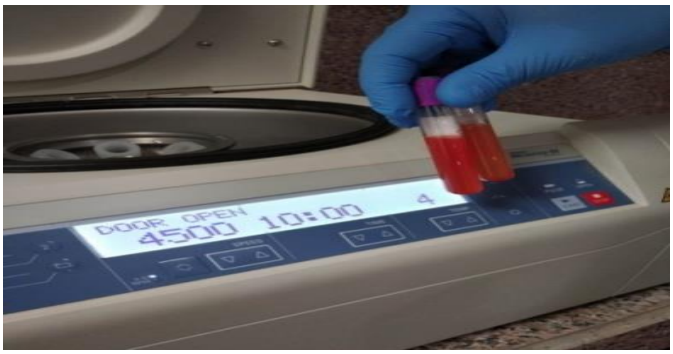


Fig. 3: Blood stratification after Second

Spin

After second spin the tubes contains platelet poor plasma on top and PRP at bottom. The supernatant is drawn and discarded leaving about 3.5cc at the bottom as platelet rich fraction of plasma. Similarly, 3.5cc of platelet rich plasma is obtained from second tube. In total 7cc of platelet rich plasma is available; of which 6 cc was injected intra-articular and 1cc is sent for culture and platelet counts.

Technique of injection

In sitting position identified injection side by palpating scapula spine and reached up to acromian process and identified anterior and posterior end of acromian process. Injection can be given by two approaches.

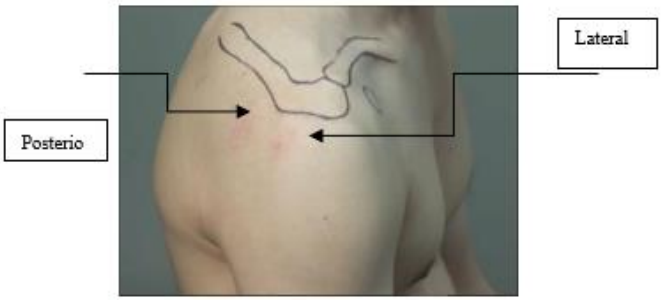
Lateral Approach: in this approach we divide acromian process in three parts anterior posterior middle. injection was given in about 2 cm below the posterior 1/3rd portion of lateral border of acromian process and needle pointing towards postero lateral to coracoids process of scapula.

Posterior Approach: we identified posterior border of acromian process and injection given in about 1 cm below and medial of posterior border of acromian process just medial to the posterior corner.

Under aseptic conditions, put on sterile surgical gloves, and betadine and surgical sprit were used to sterilize the site for injection . 1-3 ml of local anesthesia is given at the injection site subcutaneously. Using a 22-gauge spinal needle, 5–7 ml of the PRP product was injected at the subacromial region of the affected shoulder.

After injection, the patients were observed for 1 year for any adverse effect like dizziness, syncope then let to go home.

Post procedure all patients were advised to mobilize the shoulder at the earliest.



Results

The mean age of study population was 42.13± 13.03 and age range of 20 – 80 year with 53.33% affection of age group 21-40 year. Male: female ratio is almost equal in our study that is 56.67% were male and 43.33% were female. Clinically Job Test positive in all cases whereas Neer impingement sign positive in 53.33%.

Mean SPADI score before PRP was 80.23±10.69 whereas 12.96 ±4.65 after PRP and the difference between SPADI score was statistically significant. ($p<0.0001$*)

In complication pain in neck 6.67%, fever in 3.33% and recurrence rate was 10%.

According to SPADI score after PRP maximum 73.33% had excellent SPADI score after PRP whereas 16.66% had good score and 10% had poor SPADI score.

Outcome	Number	Percentage
Excellent	22	73.33
Good	5	16.66
Poor	3	10.0

Table 1: Distribution of case according to outcome

Discussion

Currently, there are few published studies that specifically investigate the safety and efficacy of PRP injections to the shoulder as a non-operative treatment option for Partial Tear RCTs. Even fewer studies seek to compare pre-and post-injection imaging to radiographically assess healing of the partially torn tendon and, at the same time, to determine a correlation between objective (i.e. image reporting) and subjective (i.e. patient report) outcome data. As PRP continues to evolve, more substantiated research is needed to understand its mechanism of action in addition to clinical data.

Out of 30 cases maximum 53.33% were in 21 – 40 yr age group and minimum 10% were in 61 -80 yr. The mean age of study population was 42.13± 13.03 with age range of 20 – 80 yr. similarly **Doaa H.Ibrahim et al (2019)**[3] found that mean age was 41.5 ± 12.5 years.

Mean SPADI score before PRP was 80.23±10.69 whereas 12.96 ±4.65 after PRP and the difference between SPADI score was statistically significant. (p<0.0001*) Similarly **El GharbawyNH et al.[4] (2020)** found that SPADI score decreased from 78.03 ± 8.25 pre-injection to 42.1 ± 13.97 post-injection(p < 0.001). Also **O. Akan, B. Mete et al.[5] (2019)** statistically significant improvements were observed in ROM, SPADI scores [P < 0.05] at 12 months.

According to SPADI score after PRP maximum 73.33% had excellent SPADI score after PRP whereas 16.66% had good score and 10% had poor SPADI score. Similarly,**Anand Kumar Singh et al.[6] (2019)** found that in partial tear 5(41.67%) have excellent, 6(50%) have good and 1(8.33%) has fair outcome on 6 months follow up.

Conclusion

Our study shows injection of PRP resulted in a safe, significant, sustained improvement in pain and functional outcomes for patients with partial Rotator Cuff Tear (RCT). This suggests that PRP may have the potential to heal the muscle-tendon unit of the rotator cuff at the level of degenerative tissue and may be a primary nonsurgical treatment for partial RCT. PRP preparation demands careful blood withdrawal, centrifugation and isolation under strict aseptic precautions and through pre injection planning. PRP seems to be a well-tolerated therapeutic application which has shown encouraging clinical results in patients with chronic partial rotator cuff tears. However, the absence of any long-term follow-up data so no comments about rotator cuff tendinopathy after a PRP injection can be made.

Limitations

1. Sample size was small.
2. Final assessment was done using subjective score and no repeat MRI was done.
3. Large, multicenter clinical trials are needed to define the best type of PRP to be used and for what specific clinical application.
4. The data supporting PRP use thus far are immature, but this biologic technology has the potential to transform the practice of musculoskeletal medicine and Orthopaedic surgery.

Reference

1. Kuijpers T, van der Windt DA, van der Heijden GJ, Twisk JW, Ver-gouwe Y, Bouter LM. A prediction rule for shoulder pain related sick leave: a prospective cohort study. BMC Musculoskelet Disord 2006;7:97.
2. Via AG, De Cupis M, Spoliti M and Oliva F (2013): Clinical and biological aspects of rotator cuff tears. Muscles, Ligaments and Tendons Journal, 3(2), Dill T (2008): Contraindications to magnetic resonance imaging: noninvasive imaging. Heart; 94(7):943-948.
3. Ibrahim DH, El-Gazzar NM, El-Saadany HM, El-Khouly RM. Ultrasound-guided injection of platelet rich plasma versus corticosteroid for treatment of rotator cuff tendinopathy: Effect on shoulder pain, disability, range of motion and ultrasonographic findings. Egypt Rheumatol . 2019;41(2):157–61.
4. El Gharbawy NH, Labib HS. Role of Platelet Rich Plasma (PRP) injection in treatment of rotator cuff tear. Egypt RheumatolRehabil . 2020;47(1).
5. Akan O, Mete B, Yılmaz H, Aliye, Tosun. Efficacy of ultrasound guided platelet-rich plasma in the repair of partial and full-thickness supraspinatus tears. 2019
6. Singh Kumar Anand et al. Clinical outcome of PRP (Platelet rich Plasma) injection in shoulder pain due to rotator cuff disorders. 2019; 5(4): 543-546

7. Singh AK, Rani B, Rawat S. Clinical outcome of PRP (Platelet rich Plasma) injection in shoulder pain due to rotator cuff disorders. Int J Orthop Sci 2019;5(4):543-546.
8. Sanchez M, Anitua E, Orive G, Mujika I, Andia I (2009): Platelet-rich therapies in the treatment of orthopaedic sports injuries. Sports medicine (Auckland, NZ); 39(5):345-354.