

Role of Platelet Rich Plasma Therapy in Inoperable Rotator Cuff Problems of Shoulder in Elderly - A Case Series

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Abstract: *Introduction:* Rotator Cuff Tear (RCT) (Partial Or Full Thickness) Is A Common Pathology Among Shoulder Disorders In People Over 50 Years Old. PRP Is Potentially Able To Produce Collagen, Growth Factors, And Probably Increase In The Number Of Available Stem Cells, Which Consequently Enhance Healing in Partial or Full Thickness Rotator Cuff Tears. *Materials and Methods:* Thirty six consecutive patients including 16 men and 20 women were enrolled and treated with an autologous PRP injection for the treatment of partial & full thickness RCT's. *Results:* Out of 36 patients who received PRP injection, 20 were females and 16 were male patients. 30 patients had complete pain relief, while 06 patients had no change in the pain intensity after both doses of the PRP injection. Hence it can be seen that 95% of the cases who received PRP injection achieved complete pain relief and complete range of movements at shoulder joint. *Conclusion:* Even though conventional method is still in use, the most common used is PRP treatment in inoperable rotator cuff tear. all patient treated with PRP had good range of motion and pain relief, and most of patients were able to do their routine or previous work and activities without any difficulty.

Keywords: Rotator cuff tears, Platelet Rich Plasma (PRP), Growth Factors

1. Introduction

Rotator Cuff Tear (RCT) (Partial Or Full Thickness) is a common pathology among shoulder disorders in people over 50 years old. The prevalence of RCT ranges from 13% to 32% which in part correlated to patient's age.

PRP is potentially able to produce collagen, growth factors, and probably increase in the number of available stem cells, which consequently enhance healing by delivering high concentrations of alpha-granules containing biologically active moieties (such as vascular endothelial growth factor and transforming growth factor-beta to the areas of soft tissue damage. This concentration may be applied either in the clinic as a nonoperative treatment or intraoperative.

2. Aim & Objective

To assess the efficacy of local injection of autologous prp into shoulder joint on pain and function of patients with rotator cuff tears.

3. Review of Literature

The PRP procedure has begun to receive attention as a regenerative treatment and research focusing on the effects of PRP on rotator cuff lesions. Growth factors regulate the expression of the phenotype that may play an important role in disease progression and PRP stimulates cell proliferation. Transforming growth factor-beta (TGF-B) Increases expression of the Phenotype and Stimulates the differentiation of Mesenchymal Stem Cells and Stromal Deposits.

Vascular Endothelial Growth Factor (VEGF) plays a role to induce cartilage, and insulin-like Growth Factor (IGF) Stimulates the Synthesis of Glycoprotein and Degrades its Catabolism. Fibroblast Growth Factor (FGF) and Hepatocyte Growth Factor (HGF) are additional growth factors that function independently or in cooperation for the regeneration. Many growth factors are stored in platelet alpha bodies. PRP injections into the RCT site will be considered a successful treatment when it results in efficient delivery, maintains high concentrations, and promotes healing.

4. Materials and Methodology

Thirty six consecutive patients including 16 men and 20 women were enrolled and treated with an autologous PRP injection for the treatment of partial & full thickness RCT's. The indication for PRP injection was physical examination and MRI findings consistent with type 1, 2 and 3 of RCT's lasting more than at least 2 months based on the ELLMAN'S classification & full thickness tears (grade 1 partial tear <3 mm deep, grade 2 partial tear 3-6 mm deep not exceeding 1 half of the tendon thickness, grade 3 partial tear >6 mm deep)

This Study Was Done In NRI INSTITUTE OF MEDICAL SCIENCES between June 2017 to June 2019 After Getting Approval From Ethical Committee. The Principal Objective Of The Current Study Is To Define The Improvement In Intensity Of Pain In Patients With RC Lesions Treated With PRP Injection At 2weeks interval for a total of 3 doses. Assessment was done at 1month, 3months, 6months, 9months, 12months of follow up as Measured by the Visual Analog Scale for Pain (VAS). The Secondary Objective Is

To Assess The Consequence Of PRP On Shoulder Functions In Day-To-Day Activities Before And After Injection. The Primary Hypothesis For This Study Is That PRP Is Effective In Decreasing Pain In Patients With RC Injury And Improving The Functional Result.

The Inclusion and Exclusion Criterias for this Study

Inclusion Criteria

- Men and Women Between 50 To 80 Years
- Primary, Traumatic or Degenerative Rotator Cuff Tears Within 18 Months Of Initial Diagnosis
- Provision of Informed Consent.

Exclusion Criteria

- Rotator Cuff Tears Secondary to Fracture and Dislocations
- Patients with an Associated Dislocation at the Time Of Study
- Rotator Cuff Tears That Underwent Prior Surgical Repair Or Revision Arthroscopy
- Preexisting Conditions Associated With Upper Extremity Pain, Including Arthritis, Ongoing Infection, Carpal Tunnel Syndrome, Cervical Neuropathy Or Other Nerve Pathology, Local Malignancy, And Systemic Disorders (Hypothyroidism, Uncontrolled Diabetes)
- Pre-Operative Platelet Count Less Than 1, 85, 000 & Haemoglobin Less Than 10 Gm%
- Problems with Follow Up

Platelet-Rich Plasma Preparation And Procedure

PRP Was Prepared Using Standard Techniques. Initially, patient's whole blood was collected with aseptic precautions in acid citrate dextrose tubes. Two sets of 17 ML of patient's whole blood is collected. This whole blood was subjected to centrifugation at 1500 RPM (Soft Spin) for 15 to 16 Mins. The whole blood will separate into three layers. the supernatant layer of plasma and buffy coat were separated and subjected to centrifugation at 3500 RPM (Hard Spin). In the final end product, the upper two-third of the tube will be containing platelet poor plasma which is removed, and the lower one-third will be prp enhanced with superficial buffy coat which will be used for injection. using A 22-To 25-Gauge Needle, 2-3 ML of The Leukocyte-Rich PRP product was injected at the rc tear site. all injections were performed after painting the patient with betadine and surgical spirit, with patients positioned in sitting position

This is executed as an OP technique. After injection, patient's arms were supported with a simple sling until pain subsides. Patients were requested to mobilize the shoulder at the earliest. All pain management methods were avoided, including oral and injections of pain medication. patient follow-up was done by attending surgeon at 8 weeks and 3 months post injection. the patients completed the VAS for Pain, Constant Shoulder Score, and UCLA Shoulder Score for Quality of Shoulder Function.

Instruments Used for PRP Injection

- 1) 20 CC Syringes - 4
- 2) 5 Cc Syringe - 1
- 3) 3 Way Cannula - 3

- 4) Sterile Dressing Kit
- 5) Insulin Syringes (With Red Cap) - 4
- 6) Scalp Vein Set
- 7) 23 Gauge Needle
- 8) Band Aid
- 9) Surgical Gloves
- 10) REMI -4C Centrifuge.
- 11) Regen PRP Extraction Kit (For Affordable Cases)

Steps for Preparation

- 1) 34 ML of Venous Blood is drawn into a syringe containing 6ml of ACD (Acid Citrate Dextrose) to finally get 4-5 ML of platelet rich plasma.



- 2) It is centrifuged (1st) for 15-16 minutes with a setting of 1500 Rpm along with counter balance to the syringe.

- 3) Three layers were formed upper being the platelets containing plasma, middle being the buffy coat layer, lower being the RBC.



- 4) Upper layer was drawn out into another syringe.

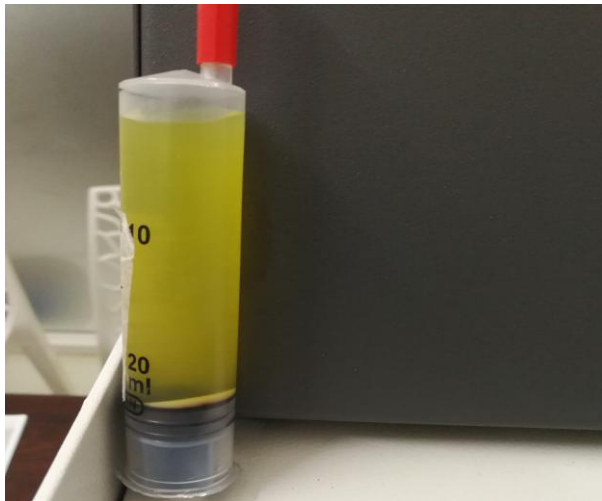
- 5) It is centrifuged (2nd) for 7-8 minutes with a setting of 3500 rpm which is very rapid, essential for platelets to sediment along with the counter balance.



6) Platelets were sedimented much down with platelet poor plasma being on the top.



8) Additional 34 ML of venous blood was taken in another syringe with 6ml of ACD and this syringe is used throughout the procedure in place of counter balance for bilateral shoulder injection.



7) Platelet poor plasma was withdrawn out with 4-5ml left in the syringe which was shaken to mix up the platelet sediment.

Post Procedural Care

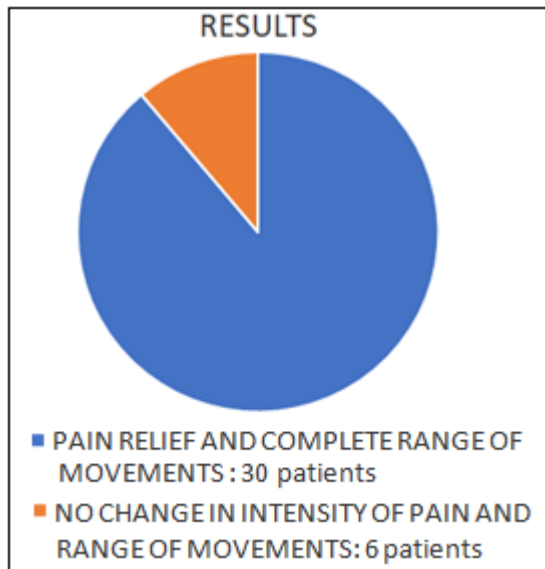
Patient vitals were monitored for 30mins after infiltration, to observe for any sudden drop in bp, tachycardia, allergic reactions etc. patients were advised cold pack compression to alleviate immediate post-procedural pain. patients were allowed to go home on the same day.

5. Results

Out of 36 patients who received PRP injection, 20 were females and 16 were male patients. 16 patients had complete pain relief after 1st dose of PRP injection, 14 patients had pain relief after 2nd dose of PRP injection, while 06 patients had no change in the pain intensity after both doses of the PRP injection. 12 patients achieved complete range of movements up to 100% at shoulder joint by the first follow up while 18 patients achieved pain free range of movements at shoulder joint up to 70% at first follow up and complete 100% range of movements by 2nd follow up, while 06 patients who had no pain relief did not show any improvement in the range of movements.



Hence it can be seen that 95% of the cases who received PRP injection achieved complete pain relief and complete range of movements at shoulder joint.

**Treatment:**

The Skin Dressing Was Sterily Conducted with A Wide Enough Area With Gloved Hands.



The Injection Site Was Approached 2 CM Below and Medial to Angle of Spine of Scapula Using A 23-Gauge Needle Under The Sitting Position.



We Used 3 MI Of PRP At The Site.



After All These Procedures, A Small Bandaid Was Applied At The Injection Site Without Compression. A Single Person Executed All Of The Procedures.

Follow Up

The Patients Went Home On The Same Day As Treatment With The Following Instructions.

Ice Packs for 2 Days

NSAIDS Advised On SOS Basis (If Pain Or Swelling At The Injected Site)

Patients Were Permitted To Continue With Daily Living Activities Immediately, But Were Limited For Extensive Use Of Their Shoulders For 6 Weeks After The Last Dose.

All Patient Complaints And Complications Were Recorded.

Post-Injection Assessments Were Planned at

1 Month
3 Month
6 Month
9 Month
12 Months

6. Discussion

Platelets Are Fragments Of Megakaryocytes In The Cytoplasm, Formed In The Marrow And Nearly 2 MM In Diameter. They Contain More Than 30 Bioactive Proteins, Most Of Which Have A Fundamental Role In Hemostasis Or Tissue Healing.

Seven Basic Protein Growth Factors That Are Actively Secreted By Platelets Initiate All Wound Healing Process Also Includes Three Proteins In Blood Known To Work/Act As Cell Adhesion Molecules: Fibrin, Fibronectin And Vitronectin.

Activation Induces The Granules Present In Platelets To Fuse To Its Cell Membrane (Also Called Degranulation) Where The Secretory Proteins (E.G. PDGF, TGF-B Etc.) Are Transformed To A Bioactive State By The Addition Of Histones And Carbohydrate Side Chains. The Active Proteins Are Then Secreted, Binding To Transmembrane Receptors Of Target Cells, Which Are Mesenchymal Stem Cells, Osteoblasts, Fibroblasts, Endothelial Cells And Epidermal Cells. These Agonists Bound Transmembrane Receptors And Then Activate An Intracellular Signal Protein That Causes The Expression Of A Gene Sequence That Directs Cellular Proliferation, Matrix Formation, Osteoid Production, Collagen Synthesis Etc. Thus Provoking Tissue Repair and Tissue Regeneration.

The Active Secretion Of These Growth Factors By Platelets Begins Within 10 Minutes After Activation, With More Than 95% Of The Pre-Synthesized Growth Factors Secreted Within 1 Hour.

Marx Proposed That Platelet In Count Of 10 Lakh/MI In 5 MI Of PRP, As A Working Definition Of PRP, Based On The Scientific Proof Of Bone And Soft Tissue Healing Enhancement.

The most common treatment approach still remains the conservative approach.

- Oral and topical anti-inflammatory medications, high-or low intensity pulsed ultrasound, extracorporeal shock wave therapy (ESWT), and injected platelet-rich plasma have been used to speed recovery.
- The patient must stop using NSAID for at least 1 week prior to the injection and avoid NSAID use for 3 to 4 weeks post injection.
- Criteria for return to normal work include full painless range of motion.

7. Conclusion

- Being newer technique, PRP treatment requires further evaluation and there is a steep learning curve.
- Even though conventional method is still in use, the most common used is PRP treatment in inoperable rotator cuff tear.
- The duration of hospital stay post procedure less than a 1 hour.
- Almost all patient treated with PRP had good range of motion and pain relief, and most of patients were able to

do their routine or previous work and activities without any difficulty

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