

Effectiveness of Platelet Rich Plasma (PRP) injections in adhesive capsulitis of shoulder

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Abstract

Introduction: Adhesive capsulitis, commonly called as frozen shoulder, defines a pathological process that causes pain, limited movements, and dysfunction in the shoulder due to adhesion occurring at the glenohumeral joint. It occurs after prolonged disuse or immobilization of shoulder. PRP can be potentially useful, which is thought to improve the healing process with regenerative effect on tendons and cartilage tissue.

Material and Methods: This prospective study comprising 50 patients between 40-65 years of age, diagnosed with frozen shoulder fulfilling the inclusion criteria were included. Intra-articular PRP injection were given and followed up at 2 weeks, 4 weeks and 3 months. Range of movements (ROM) and DASH (Disability of arm, shoulder and hand) score at final follow ups were compared with pre-injection data.

Results: Average age of patients was 54.5±5.7 years, female outnumbered male (female 32, male 18) and right

side was more involved than left (right 28, left 22). Average duration of presentation after trauma was 5 month and 15 days. All ranges of motions of the shoulder and DASH score improved after PRP injection ($p<0.05$).

Conclusion: Our study supports the use of PRP in frozen shoulder which is safe and has shown significant improvement and can become indispensable part of treatment for frozen shoulder.

Keywords: frozen shoulder, PRP, Intra-articular injection, DASH score

Introduction

Adhesive capsulitis, commonly called as frozen shoulder, defines a pathological process that causes pain, limited movements, and dysfunction in the shoulder due to adhesion occurring at the glenohumeral joint. Its incidence is approximately 3%–5% in the general population¹. It is most common in 40-65 yrs of age with female sex preponderance². It occurs after prolonged disuse or immobilization secondary to trauma to shoulder

itself or away from shoulder joint in same limb. Clinical presentation may progress with spontaneous remission within 2–4 years, but it is refractory in 40% of cases³. The disease has been described as passing through three stages and each of these are specific and characteristic in terms of symptoms. Stage 1- Painful phase- insidious onset of pain with gradual progression without loss of movement. This stage last between 2-9 months. Stage 2- Frozen phase- Pain of stage 1 may improve with loss of movements in all directions. This stage may last 4-9 months or even more. Stage 3- Thawing phase- gradual return of movements in 12-24 months.

The diagnosis is established based on history and clinical examination as well as standard radiographs.

Various treatment modalities being given, such as nonsteroidal inflammatory drugs (NSAIDs), physical therapy, hydro dilatation, oral/ intra-articular steroid injections, manipulation under anesthesia, and surgical release - open or arthroscopic⁴. PRP comprising many growth factors is being used in the treatment of several musculoskeletal diseases. It has been suggested that PRP can be potentially, which is thought to improve the healing process with regenerative effect on tendons and cartilage tissue⁵. In this study, we aimed to evaluate the effectiveness of PRP in patients of frozen shoulder, with assessment done using DASH score and range of motion (ROM) of shoulder.

Material and methods

This prospective study comprising 50 patients between 40-65 years of age, diagnosed with frozen shoulder visiting the Orthopedics OPD fulfilling the inclusion criteria were included in the study after informed consent. Patient with platelet dysfunction syndrome, intrinsic glenohumeral pathology such as glenohumeral arthritis, who received local injection to the shoulder

within the prior 3 months; those with local infection at the shoulder, systemic infection, or inflammatory disease (e.g., rheumatoid arthritis and hepatitis); and those who received systemic steroid therapy within the prior 3 weeks were excluded from the study.

PRP preparation

In each patient, venous blood samples (8 ml x 3) were collected in three sterile tubes containing 2 ml of anticoagulant citrate dextrose solution from the cubital veins. The tubes were centrifuged at 1195 rpm for 20 min, resulting in three layers of whole blood sample: first layer, plasma (superior layer); second layer, buffy coat (platelets together with leukocytes); and third layer, erythrocytes (inferior layer). The first and second layers were transferred to three empty tubes and re-centrifuged at 1890 rpm for 15 min under laminar flow. The first platelet-poor layer was collected by a syringe, which was not used. The second layer was PRP. From three tubes, 4.5 ml of PRP (1.5 ml from each tube) was obtained and divided into three aliquots. Two aliquots were used in the treatment, whereas one aliquot was assigned for platelet count to ensure the platelet count desired.

In our study both anterior and posterior approaches for intra-articular injections of PRP were used under sterile conditions. Patients discharged same day with instructions to limit the use of arm for 24 hours to reduce inflammatory changes post injection injury. Only Paracetamol was given during the study period. All patients were put on physiotherapy. Post PRP injection regular follows up done at 2 weeks, 4 weeks and 3 months. If at 2 weeks no significant improvement in DASH score was found second PRP injection was repeated. Final follow-up ROM and DASH score were measured and compared with pre-injection data.

Results

In our study average age of patients was 54.5±5.7 years, female outnumbered male (female 32, male 18) and right

side was more involved than left (right 28, left 22). Average duration of presentation after trauma was 5 month and 15 days.

Table 1: Demographic data

Mean age (n=50) in years	54.5±5.7 (43–62)	
Symptom duration in month	5.5±1.7 (3–8)	
Gender	32 females	18 male
Involved shoulder	28 right	22 left

All ranges of motions of the shoulder and DASH score improved after PRP injection (p<0.05) (Table 2). On follow-up at 2 weeks 6 out of 50 patients show negligible improvement in DASH score, so second PRP injection was given. No major procedure related complication occurred and none of the patients deteriorated.

Table 2: Outcome comparison

	Pre-injection	Post-injection (final follow up)
Movements (mean in degree)		
Flexion	95°	145°
Extension	30°	55°
Abduction	79°	140°
Adduction	32°	48°
External Rotation	39°	62°
Internal Rotation	31°	58°
Mean DASH score	61.2	31.6

Discussion

The treatment of frozen shoulder is challenging, considering that this condition affects working age population, a successful recovery is even more important. Since standard methods (analgesics, physiotherapy) applied sometimes do not achieve satisfactory results, the PRP treatment appears to be a possible solution^{6,7}. PRP as modality of treatment is not new in the field of medicine, but is new as far as frozen shoulder is concerned. The purpose of this prospective study was to evaluate how PRP affects healing inpatients of frozen shoulder. As there is no large study available on use of

PRP in frozen shoulder, the results of present study are compared with relevant studies. Mean age in our study was 54.7 years, which shows patients of elderly age groups are more prone to develop frozen shoulder. There were 32 females out of 50 patients in the present study. This shows females are more prone to develop frozen shoulder because of lack of physical activity and hormonal imbalances after menopause. Those patients who had disease of longer duration were recovered very slowly because of more stiffness. Range of Motion (ROM) at presentation and at final follow-up after PRP injection of present study was compared with study on

manipulation under anesthesia with hydro dilatation by Quraishi et al⁸ (Table 3). Mean DASH scores at presentation and at final follow-up after PRP injection of

present study was compared with study done by Jakovljevic et al⁹ (Table 4).

Table-3: Comparison of Range of Motions

Study	Pre-injection						Post-injection (final follow up)					
	Flex.	Ext.	Abd.	Add.	I.R.	E.R.	Flex.	Ext.	Abd.	Add.	I.R.	E.R.
Quraishi et al ⁸	93	-	78	-	39	23	134	-	129	-	53	45
Present study	95	30	79	32	31	39	145	55	140	48	58	62

Table 4: Comparison of DASH score

	No. of Patients	Follow-up	DASH score Pre-intervention	DASH score Post-intervention	P value
Jakovljevic et al ⁹	52	13	42	13	<0.05
Present study	50	3 months	61.2	31.6	<0.05

Conclusion

Our study supports the use of PRP in frozen shoulder which is safe and has shown significant improvement and can become indispensable part of treatment for frozen shoulder. However larger randomized multicentric trials are required to set standards in terms of number, frequency of administrations and platelet concentration.

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