ORIGINAL ARTICLE

# Comparison of outcome of intra-articular steroid injection versus autologous platelets rich plasma in frozen shoulder patients

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**Abstract**

**Introduction: Frozen shoulder is one of the most common shoulder pathologies seen by shoulder surgeons in the clinic. It is mainly seen in theelderly and diabetics. Frozen shoulder also known as adhesive capsulitis causes a restrictions in motion especially external rotation is limited thus affecting activities of daily life. Conservative management is the first line of treatment. Most patients respond well to physiotherapy but in other cases intra-articular injections may prove useful. Historically, steroids were used but steroids have harmful effect and can be chondro-toxic therefore they have been abandoned. In modern times, orthobiologics such PRP have been effective and have no side effects. This study compares outcomes of patients managed by steroids against PRP.**

**Material and Methods: A randomised control trial was performed at lady reading hospital from13-12-2019 till 12-06-2020. Patient between 18-70 were included in study with an established clinico-radiological diagnosis of frozen shoulder. Patients treated with steroids were grouped in A whereas patients receiving PRP were labelled in group B. A total 164 patients were enrolled and followed up for the stated study period. Non probability sampling technique was utilised. Data was entered in SPSS. Chi-square was used to compare the efficacy between the groups and the confidence interval was set at 95% with a p-value of 0.05 as significant.**

**Results: Efficacy in both groups is insignificant when stratified by age. Males have superior efficacy than females in both groups, despite being statistically insignificant. Efficacy was larger in non-diabetics than diabetics, although not statistically significant. Efficacy was higher in patients who received regular physiotherapy and lower in those who did not receive regular physiotherapy, but this was not significant in either group.**

**Conclusion: Based on our findings, we advocate treating patients with frozen shoulder with platelet rich plasma and steroids for better outcomes. This treatment is safe, in-expensive, and gives instant symptom alleviation and early restoration to virtually full function. Our findings require more randomised, double-blind investigations.**

**Keywords: frozen shoulder, platelet rich plasma, intraarticular steroid injection, cryotherapy**

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## Introduction:

Cryotherapy is a non-invasive method of treating frozen shoulder. It is used to treat patients who are unable to move their shoulder or perform passive elevation or external rotation. Adhesion and fibrosis in the shoulder joint capsule limit intra-articular volume, causing frozen shoulder. An adhesive capsulitis, or frozen shoulder, produces severe morbidity, particularly shoulder discomfort and external rotation.[2]

Frozen shoulder affects 3-5 percent of people aged 40-70. It is far more common in diabetics. Evidence suggests 10-20% frequency in diabetics.[3] (However, there is no difference in discomfort, range of motion, or morbidity between

diabetics and non-diabetics.) However, 40% of people with the disease have symptoms or disabilities that last a lifetime.[5]

Various non-surgical treatments have been shown to help most patients with frozen shoulder. The primary choice for these patients is rehabilitation. The most popular treatments are passive mobilisation and capsular stretching.[1] Anesthesia-induced manipulation, capsular hydraulic distention, arthroscopic capsular release and recently platelet rich plasma injection have all been mentioned as therapy possibilities.[6]

Intra-articular steroid injections have long been used to treat frozen shoulder, with up to 86% success in terms of pain alleviation and shoulder movement. Complications include pain, vasovagal reaction, and changes in serum glucose levels, increased risk of capsular or tendon rupture, post-injection pain, subcutaneous atrophy, and skin depigmentation have led clinicians to seek better alternatives.[8] Platelet-rich plasma (PRP) is a plasma concentration of human platelets. PRP production by centrifugation is now simple enough to employ in both offices and operation rooms. PRP use has expanded due to its safety and improved equipment for outpatient preparation and delivery. For example, giving large quantities of alpha-granules carrying biologically active moieties (e.g. vascular endothelial growth factor and transforming 5 growth factor) to damaged soft tissue improves recovery.[9] Using platelet-rich plasma injections to treat frozen shoulder has yet to be shown. Using autologous PRP without steroids improved shoulder function by 70%.[5] There is no significant difference between the steroid and PRP groups, however the PRP group had no long-term consequences of steroids.[10]

Our OPD treats many patients with frozen shoulder every day, with intra-articular steroid injections as a last resort. Because PRP injections have been shown to be effective in repairing tendons, muscles, and ligaments, we will employ PRP on a patient with frozen shoulder and compare its success to patients who receive intra-articular steroid injections.

The study will allow us to adopt this new modality of treatment with no known problems but good outcome as appropriate treatment for community frozen shoulder. The aim is to determine the outcome of intra articular steroid injection versus autologous platelet rich plasma PRP in frozen shoulder patients.

**Material and Methods:**

After ethical review board approved the protocol for the randomised control trial. Data collection began on December 13th, 2019. The study was conducted at Lady Reading Hospital, Trauma & Orthopedic Surgery Department, ortho-B unit between 13 December 2019 to 12 June 2020.

The null hypothesis was Intra articular autologous platelet rich plasma is more effective than intra articular steroid injection for frozen shoulder.

The study included people who met the criteria through our outpatient service. Idiopathic frozen shoulder was characterized by discomfort of any grade on the VAS over the last 3 months and decreased range of motion of at least 20 degrees determined clinically on goniometer in any direction.

Inclusion criteria includes patients aged 18-70 are eligible. Inactive shoulder flexion, abduction, extension, and external rotation, with normal antero-posterior radiographs of the shoulder joint in neutral posture. Either sex.

Exclusion criteria includes previous shoulder trauma with or without fracture. Previous shoulder surgery history. History of hypothyroidism. Patients who have had intra-articular steroid injections or hydrostatic distension previously. Evidence of CRPS. Patients on anti-platelet or anti-coagulant treatment. Patients who are pregnant or nursing. Patients missing 6-weeks after intra-articular steroid or PRP injection.

A clinical examination, history, radiograph, and previous medical data were used to exclude. These patients were confounders, and their inclusion in the study sample threw off the results.

The sample size was 164 (82 for steroids and 82 for PRP), based on the literature's overall improvement of 86%[7] and 70%[5] for each group, 95% confidence level and 80% power of test. Consecutive non-probability sampling was used.

All patients were informed of the study's goal, benefits, and that it was conducted only for research and data dis-semination, in accordance with medical ethics. All patients signed informed consent forms. The treatment was performed as a day case in the operating theatre by an orthopaedic expert.

Patients were randomly assigned to group A or B and received intra-articular steroid injections or autologous platelet rich plasma injections.

A complete clinical history was collected, followed by a general physical and systemic examination to measure shoulder discomfort and range of motion.

In both cases, the patient sat in a chair with the shoulder neutral and the goniometer recorded the range of motion. Both groups of patients received intra-articular injections. Preparation of skin with povidone iodine On the skin and soft tissues surrounding the joint capsule, 3 ml of 1% plain lidocaine "21" guage needle 8 ml lignocaine 1% + 2 ml depomedrol 80mg/2ml (methyl prednisolone acetate). Group A patients had intra-articular injections of steroid+Lignocaine.

In group B, 20 ml autologous blood was drawn from the ante-cubital vein of a healthy upper limb, centrifuged, and 2 ml platelet rich plasma mixed with 8 ml normal saline injected into the shoulder joint as described below.

Anterior approach (21-gauge x 1.5 needle via delto-pectoral groove, below and medial to coracoid process, coracobrachialis - biceps origin and subscapularis) "nipper Everyone in both groups had active and assisted range of motion exercises for 10 minutes after the procedure, and then they were allowed to do them at home for 6 weeks.

All patients were reviewed six weeks later to establish intervention success in terms of decrease in pain alleviation by at least three grades and increase in shoulder joint range of motion by at least 20 degrees in any direction.

Name, age, gender, residence, frequency of physical therapy exercises, pain and range of motion of shoulder joint were all documented on a specially developed proforma attached at the end.

All data were entered and analysed using SPSS 21. Age, baseline and post-treatment range of motion were calculated using descriptive statistics. Gender, diabetes, physiotherapy, and efficacy were all calculated as percentages. The Chi square test was used to compare two groups' efficacy. Efficacy was defined as a 20-degree improvement in active range of motion (completed by patients without assistance) at 6 week follow up. Age, gender, diabetes, and physiotherapy were stratified. We used chi-square post stratification. A p-value of 0.05 or less was judged significant.

**Results:**

The study included 164 patients with active shoulder flexion, abduction, extension, and external rotation loss of more than one-third.

Patients in Group A received intra-articular steroid injections, whereas those in Group B received autologous platelet rich plasma injections.

Group A had 34(41.5%) males and 48(58.5%) females, while Group B had 38(46.3%) males and 44(53.7%) females, with a Male to Female ratio of 0.86:1 in group-A, Male:female ratio was 0.78:1. The female preponderance was statistically insignificant with pvalue=0.319 (Table 1).

In Group A, the average age was 45.8 years +12.16 SD, with 12(14.6%) patients under 30, 19(23.2%) between 31-40, 15(18.3%) between 41-50, and 36 (43.9%) above 50. Group B had an average age of 48.5 years +11.37SD, with 4(4.9%) patients under 30, 23(28%) be-

tween 31-40, 16(19.5%) between 41-50, and 39(47.6%) above 50. The patients' average age was 47.15+1.8SD. The group's age distribution was equally non-significant (p=0.209). According to (table 2), Group A was effective in 68(82.9%) patients, while Group B was effective in 61(74.4%) patients, with a p-value of 0.126. (Table 3) The effectiveness of both groups increases with age. Patients under the age of 20 showed effectiveness in 11(91.7%) in Group A and 4(100%) in Group B. Efficacy in both groups is insignificant when stratified by age. As seen in table 4, males have superior efficacy than females in both groups, despite being statistically insignificant. (Table 5) Efficacy was larger in non-diabetics than diabetics, although not statistically significant. (Table 6) Efficacy was higher in patients who received regular physiotherapy and lower in those who did not receive regular physiotherapy, but this was not significant in either group.[7]

**Discussion:**

Frozen shoulder is a frequent shoulder joint disorder seen in orthopaedics. Idiopathic shoulder ROM loss affects 3% of the population.[16]

The treatment for frozen shoulder is muddled and conflicting in the literature.[17] There is no consensus on how to treat frozen shoulder.[11,17]

NSAIDs, oral steroids, intra-articular injections, hydraulic distention, MUA, open surgical release, and arthroscopic capsular release are all alternatives.[12-15] PRP use has expanded due to its safety and improved equipment for outpatient preparation and delivery. A high concentration of alpha-granules containing biologically active moieties (such as vascular endothelial growth factor and transforming growth factor-) is delivered to the sites of soft tissue injury by platelet-rich plasma.[9]

PRP as a treatment is not new in medicine, however it is new for frozen shoulder. This study's goal was to assess how PRP affects healing in patients with post-traumatic frozen shoulder. As there is no major investigation on PRP in frozen shoulder, the present study's outcomes are compared to relevant studies.

In our study, male to female had a 0.70:1 ratio of frozen shoulder, which matches Richard Dias et al.[16] The age distribution mentioned in the literature ranges from 22 to 85 years.[19] Our study's mean age was 47.15+1.8SD, ranging from 18 to 70. This matched Reisaddat et al[16] findings.

Our research found improvements in abduction, forward elevation (flexion), and rotation. Other studies[17-19] indicated similar improvements in motion.

A case report by Haidreza et al. indicated that PRP treatment can help about 40% of frozen shoulder patients who have permanent impairment.[21]

In comparison to less established effective physiotherapy and corticosteroids with potential direct or apparent adverse effects, he has shown that intra-articular and subacromial injections of PRP had more than 3-fold improvement in range of motion and 70% improvement in function.

PRP injections improved results in patients with frozen shoulder, according to Sanchez et al.[18]

In a recent study, PRP injections were compared to procaine for treating frozen shoulder. They discovered that PRP outperformed procaine in terms of pain relief and shoulder movement.[19]

Others have reported no benefit in utilising PRP during shoulder surgery.[23,24] Although local corticosteroid injections have been shown to relieve pain in shoulder tendinopathies, their possible side effects, especially in the elderly, should be considered.[25] By altering the collagen fascicles,[26] local corticosteroid injection can weaken and tear the injected tendon. Two recent studies compared the effects of PRP injections on rotator cuff tears to cortisone injections at 6 weeks, 12 weeks, and 6 months. The authors concluded that PRP injections outperform cortisone injections in terms of benefit sooner, while no statistically significant difference was seen at 6 months.[25,26]

Our study has limitations due to absence of regular physiotherapy, NSAIDS, and short follow up. More long-term and comparative investigations may be required to verify our findings.

**Conclusion**:
Platellet Rich Plasma treatment is a novel procedure with a steep learning curve. Even though traditional treatment is still the most prevalent, Platellet Rich Plasma treatment for frozen shoulder is a viable and effective alternative for adults.

Based on our findings, we advocate treating patients with frozen shoulder with platelet rich plasma and steroids for better outcomes. This treatment is safe, inexpensive, and gives instant symptom alleviation and early restoration to virtually full function. Our findings require more randomised, double-blind investigations.

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**Role and contribution of authors**:

Qaisar Alam, collected the data, references and wrote the article.

Wali Muhammad, collected the data and helped in introduction writing.

Nek Muhammad Khan, collected the references and helped in discussion writing.

Aimal Sattar, collected the data, references and helped in result writing.

Dr Naeem ullah, critically review the article and made final changes.

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