

Comparative Analysis on Efficacy of Injection Methyl Prednisolone vs Autologous PRP in Adhesive Capsulitis/Peri Arthritis/Frozen Shoulder

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ABSTRACT

Background: Shoulder pain is a common cause of morbidity in the community & most common cause of the pain include degenerative disease affecting the glenohumeral and acromioclavicular joints & supporting soft tissue structure. The application of intraarticular corticosteroid injection is one of the commonly used approaches in PA shoulder. Hence, we conducted a study to investigate the effectiveness of PRP (Platelet Rich Plasma) compared with local corticosteroid injection on Frozen shoulder (Peri Arthritis) & the possible benefit of one method over the other.

Materials and Methods: The study was conducted in the Department of Orthopaedics, North DMC Medical College and Hindurao Hospital, Delhi (India) over a period of 24 months from June 2017 to June 2019. A total of 60 subjects more than 18 years of age were included in the study and divided into Group A-receiving PRP and Group B receiving methylprednisolone. Clinical assessment was made before injection 1 month, 2 month and 6 months following injection and consisted of pain and function assessment on QUICK DASH-9 and Visual Analogue Scale. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Results: The mean age in the PRP group was 50.600±5.47 & the mean age in steroid group was 52.93±4.47. The right side was affected more in both PRP group (n=17) and steroid

(n=19). The p value of 0.598 suggest no significant difference of affected side in both groups. There was a significant difference in VAS between Month and 2 month & 6 month. And there was a significant difference in VAS between 2 month and 6 month. The outcome was excellent amongst 10% subjects, Good amongst 66.67% subjects, fair amongst 13.33% subjects and poor amongst 10% patients.

Conclusion: Both PRP (Platelet Rich Plasma) & Steroid showed equal effectiveness in treating frozen shoulder.


Keywords: Effectiveness, Platelet, Pain, Shoulder, Visual.

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INTRODUCTION

Shoulder pain is a common cause of morbidity in the community & most common cause of the pain include degenerative disease affecting the glenohumeral and acromioclavicular joints & supporting soft tissue structure. It usually develops between the ages of 40-70 years.¹

Adhesive capsulitis is often regarded as a self-limiting disease that resolves between 1 and 3 years. However, various studies have shown that between 20% and 50% of patients may go on to develop long-lasting symptoms.^{2,3} FS may arise spontaneously without an obvious preceding cause, or be associated with local or systemic disorders. Zuckerman proposed to classify FS into primary and secondary and subdivided secondary FS into intrinsic, extrinsic and systemic ones.²

The underlying pathology is soft tissue fibrosis & inflammation of the rotator interval, capsule & ligaments. The hallmark sign of this condition is being unable to move the shoulder either actively or passively. While many types of treatment have been employed in the treatment of shoulder disorder, few have been proven effective such as simple analgesia, NSAIDS, intraarticular steroid, platelet rich plasma injection & surgery. The application of intraarticular corticosteroid injection is one of the commonly used approaches in PA shoulder.⁴

Given the background of inconclusive evidence for treatment modalities & recent introduction of PRP as a biological agent promoting healing⁵, there is a need to examine the role of PRP & compare its efficacy with steroid injection. A recent review article

concluded that long term outcome (6 months) with PRP was better as compared to steroid injection, local anesthetic & other conservative treatments.⁸ Hence, we conducted a study to investigate the effectiveness of PRP (Platelet Rich Plasma) compared with local corticosteroid injection on Frozen shoulder (Peri Arthritis) & the possible benefit of one method over the other.

MATERIALS AND METHODS

The study was conducted in the Department of Orthopaedics, North DMC Medical College and Hindurao Hospital, Delhi (India) over a period of 24 months from June 2017 to June 2019. Subjects were recruited from patients presenting in orthopedic OPD, Hindu Rao Hospital, Delhi (with a primary diagnosis of frozen shoulder or Adhesive capsulitis) after obtaining written informed consent.

Diagnosis of frozen shoulder was made on clinical grounds and ultra sonographic imaging. A total of 60 subjects more than 18 years of age were included in the study and divided into Group A-receiving PRP and Group B receiving methylprednisolone. Subjects with Pain over the shoulder, With duration of symptoms more than 3 month, Limitation of internal rotation of shoulder assessed clinically, Pain severity with minimum score of 5 (based

on 10 scale visual analogue scale) were included in the study. All the patients who underwent PRP injection & Methyl prednisolone injection were counseled in their own language and explained in detail about the nature of the disease, the procedure and possible complications. A detailed history of past treatment was taken. Detailed history of any previous injury to shoulder or presence of any systemic disease was taken. After completion of investigations patients were treated by one of method and followed up for outcome evaluation. The procedure was carried out under all aseptic precautions. Shoulder was prepared with povidone iodine scrub and spirit and then draped. Patient in the steroid treatment group will be treated with 2ml of methylprednisolone (80 mg) with 6ml of 2% lignocaine hydrochloride. The injection will be administered with a standard 20-gauge needle via posterior shoulder approach. Post procedure patient were called for follow up at 1 months, 2 months and then 6 months. At each visit subjective assessment were documented with a detailed interview. Clinical assessment was made before injection 1 month, 2 month and 6 months following injection and consisted of pain and function assessment on QUICK DASH-9 and Visual Analogue Scale. All the data thus obtained was arranged in a tabulated form and analyzed using SPSS software.

Table 1: Affected side in both groups.

Side Affected	Group 1		Group 2		p value
	Frequency	%	Frequency	%	
Left Shoulder	13	43.3%	11	36.7%	0.598
Right Shoulder	17	56.7%	19	63.3%	
Total	30	100%	30	100%	

Table 2: Comparison of VAS b/w Autologous PRP (group 1) & Steroid (group 2)

VAS		Mean Difference	Std. Error	p value
PRE VAS	1 MONTH VAS	5.533*	0.178	<0.001
	2 MONTH VAS	6.733*	0.244	<0.001
	6 MONTH VAS	4.933*	0.244	<0.001
1 MONTH VAS	2 MONTH VAS	1.200*	0.188	<0.001
	6 MONTH VAS	-0.6	0.233	<0.001
2 MONTH VAS	6 MONTH VAS	-1.800*	0.217	<0.001

Table 3: QUICK DASH-9 SCORE at 1, 2, 6 month follow up

QUICK DASH-9		Mean Difference	Std. Error	p value	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
Pre QUICK DASH-9	1MONTH QDASH-9	19.250*	0.746	<0.001	17.138	21.362
	2MONTH QDASH-9	44.917*	1.595	<0.001	40.4	49.433
	6MONTH QDASH-9	80.758*	1.282	<0.001	77.129	84.387
1 MONTH Dash	2MONTH QDASH-9	25.667*	1.281	<0.001	22.041	29.293
	6MONTH QDASH-9	61.508*	1.091	<0.001	58.419	64.598
2 MONTH Dash	6MONTH QDASH-9	35.842*	1.261	<0.001	32.271	39.413

Table 4: Results In PRP group at end of study

Results (Subjective)	Frequency	%
Excellent	0	0%
Good	10	33.33%
Fair	15	50%
Poor	5	16.67%
Total	30	100%

Table 5: Results In Steroid group at end of study

Results (Subjective)	Frequency	%
Excellent	3	10%
Good	20	66.67%
Fair	4	13.33%
Poor	3	10%
Total	30	100%

RESULTS

The mean age in the PRP group was 50.600 ± 5.47 & the mean age in steroid group was 52.93 ± 4.47 . The $p=0.076$ suggests that there was no statistically significant difference of age between the two groups. Majority of patients were seen in the age group of 40-58 years.

Table 1 illustrates the affected sides amongst both the groups. The right side was affected more in both PRP group ($n=17$) and steroid ($n=19$). The p value of 0.598 suggest no significant difference of affected side in both groups.

For Group 1, it was observed that the mean Pre VAS was 8.53 ± 0.51 which declined to 0.00 ± 0.70 at 1 month, further declined to 4.70 ± 1.24 at 2 month and was at 1.07 ± 1.36 at 6 month. For group 2, the mean Pre VAS was 8.23 ± 0.68 which declined to 2.70 ± 0.79 at 1 month, further declined to 1.50 ± 1.04 at 2 month. Thereafter, it increased to 3.30 ± 1.24 at 6 months. Further, it was observed that the mean VAS was significantly different at 1 month, 2 month and 6 month when compared between the two groups (p value of <0.001). Post-hoc analysis showed that there was a significant difference in mean VAS between all the time points for the group (p value of <0.001). To elaborate, there was a significant difference VAS between PRE VAS and 1 Month, 2 month & 6 month. There was a significant difference in VAS between Month and 2 month & 6 month. And there was a significant difference in VAS between 2 month and 6 month. (Table 2)

Pre-injection mean DASH score in PRP group was 85.07 ± 5.73 and in steroid group was 87.08 ± 4.29 . The p value of 0.128 suggests that there was no statistically significant difference of Pre-injection DASH score between two groups. At first follow up (1 month) the mean DASH scores in PRP and Steroid groups were 65.82 ± 5.15 and 28.98 ± 15.55 respectively. The $p < 0.001$ shows that the difference was statistically significant between the two groups. At second follow up (2 months) the mean DASH scores in PRP and Steroid groups were 40.15 ± 8.32 and 13.48 ± 10.87 respectively. The $p < 0.001$ shows that the difference was statistically significant between the two groups at second follow up. At third follow up (6 months) the mean DASH scores in PRP and Steroid groups were 4.30 ± 5.48 and 25.23 ± 13.55 respectively. The $p < 0.001$ shows that the difference was statistically significant between the two groups at third follow up. Post-hoc analysis showed that there was a significant difference in mean QUICK DASH-9 between all the time points for the group (p

value of <0.001). To elaborate, there was a significant difference in between PRE QUICK DASH-9 and 1 Month, 2 month & 6 month. There was a significant difference in QUICK DASH-9 between 1 Month and 2 month & 6 month. And there was a significant difference in QUICK DASH-9 between 2 month and 6 month. (Table 3)

Table 4 shows the Results in PRP group at end of study. The outcome was excellent amongst 10% subjects, Good amongst 66.67% subjects, fair amongst 13.33% subjects and poor amongst 10% patients.

Table 5 shows the Results In methyl prednisolone group at end of study. The outcome was excellent amongst no subjects, Good amongst 33.33% subjects, fair amongst 50% subjects and poor amongst 16.67% patients.

DISCUSSION

The term periarthritis was coined to describe a probably heterogeneous group of conditions that included frozen shoulder. Codman first used the term "frozen shoulder" in 1930. He wrote that the condition was "difficult to define, difficult to treat, and difficult to explain."⁶ Many studies indicate that the main pathology is an inflammatory contracture of the shoulder joint capsule. This is associated with an increased amount of collagen, fibrotic growth factors such as transforming growth factor-beta, and inflammatory cytokines such as tumor necrosis factor-alpha and interleukins. Immune system cells such as B-lymphocytes, T-lymphocytes and macrophages are also noted. Active fibroblastic proliferation similar to that of Dupuytren's contracture is documented.⁷ Neviasser, in 1945 named the condition "adhesive capsulitis". He was the first to combine observations from a cadaver study with histologic analysis, and reported thickening of the joint capsule and adherence of the capsule to the humeral head with an unaffected bursa He suggested that this is due to a chronic inflammatory process. This theory was later contradicted by Lundberg, and Bunker and Anthony, who described a primary pathology of fibrosis, making the morphology of frozen shoulder the same as Dupuytren's contracture. They found no significant number of inflammatory cells and no synovial involvement.⁷ The recent study by Aslani j et al shows that on treatment with PRP, VAS scores significantly improved from pre-injection level on subsequent follow up.⁸ In the present study, there was significant improvement in the pain score after PRP injection from 8.53 ± 0.51 to 1.07 ± 1.36 at final follow up. Various studies in the literature support the use of injection PRP in treatment of frozen shoulder with significant improvement in pain & VAS score. VAS in steroid group improved significantly from pre injection VAS of 8.23 ± 0.68 to 2.70 ± 0.79 at 1st follow up to 1.50 ± 1.04 at 2nd follow up with improvement in pain and ROM active as well as passive assessed by clinical examination . The present study proves the efficacy of steroid at short term as suggested by other authors like Saedian SR et al⁹ and Kothari SY et al¹⁰ with improvement in active and passive movement. The present study showed significant improvement in QuickDASH-9 at end of 6 months with mean of 4.30 ± 5.48 . Previous study also have shown the improvement in DASH score and QuickDASH but the follow up time frame was different in both the study with Kothari following the patient for 12 week and Madhan j for 12 months. At long term Quick DASH-9 in PRP group was superior than Steroid group.¹⁰ Hazleman¹¹ summarized numerous studies on the use of intra-articular

corticosteroid and reported that success of treatment is dependent on the duration of symptoms. Patients treated within 1 month of onset of symptoms recovered in an average of 1.5 months. Patients treated within 2 to 5 months of onset of symptoms recovered in 8.1 months; patients treated 6 to 12 months after onset of symptoms required an average of 14 months for full recovery the similar thing happened in our study group who were assessed by clinical examination but the drawback was due to high patient work load in government hospital and patient unwillingness goniometric assessment was not possible in follow up & based on VAS & QUICK DASH-9 score evaluation of patient was done. In view of very limited studies on efficacy of PRP using QUICK DASH-9 at 1st month 2nd month and 6th month, the outcome could not be satisfactorily compared with the literature were follow up were different ,Same time bound follow up study need to be conducted to see the effectiveness of PRP using quick DASH-9.

CONCLUSION

Both PRP (Platelet Rich Plasma) & Steroid showed equal effectiveness in treating frozen shoulder however the effect of PRP has gradual onset of action with better outcome on the late follow up (6 months) and steroid has an early onset.

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