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Evaluation Of The Role Of Intra-Articular PRP Injection In Frozen Shoulder

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Abstract:
Background *Periarthritis or frozen shoulder, also called adhesive capsulitis, is characterized by stiffness and pain along with gradual loss of active and passive movement in the glenohumeral joint. More than 2- 5% of the population suffers from periarthritis with a higher incidence in the age group of 40-60 years. Some suggest different nonoperative treatments like physical therapy, exercises, articular stretching and pulley therapy and some suggest physical therapy with medication. Intensive physical therapies including passive stretching and manual mobilization have shown average results. Similarly, low oral corticosteroid has potential hyperglycemic effect. But, the combination of physical therapy and medication have shown better results. The justifcation for intraarticular PRP injection is that it decreases infammation which leads to reduction in capsular fibrosis. Hence in this study we aim to find out the effectiveness of intrarticular PRP injection in frozen shoulder.*
Methods *It is an Observational study with a sample size of 60 (on the basis of previous OPD records during the period of one year). Inclusion criteria were patients of either gender aged above 40 years having U/L or B/L frozen shoulder with a duration of pain more than or equal to eight weeks. Exclusion criteria were patients with a history of previous treatment for a frozen shoulder (on medical record), patients with previous history of trauma or surgery to the concerned shoulder, systemic disorders like Rheumatoid Arthritis or any bleeding disorder, any recent history of aspirin or aspirin like drug intake, patients losing follow-ups and not completing the full treatment duration were also excluded. Patients having diabetes mellitus, pregnant or lactating females were also excluded from the study. PRP is made by collecting 20 ml of the patient's blood from the superficial saphenous vein by double syringe and centrifuging at 5000 rounds per minute (rpm) for five minutes to separate the blood into layers of red blood cells, buffy-coat of leucocytes, and plasma and lastly PRP (leucocyte rich) was collected. This preparation was injected in the subacromial bursa and intra-articular space via anatomical approach. The pain was assessed before and after six weeks of treatment and improvement was labeled. The outcome was determined in terms of improvement in pain and measured on VAS (0-10, where 0 shows no pain, and 10 shows the worst pain) and improvement was labeled if there was a ≥ 50% reduction in the pain after treatment at the sixth week. All data were collected on a predesigned proforma. The process was repeated weekly for four weeks. In this phase, PRP was injected only in the GH joint. Shoulder stretching exercises were recommended to the patient after every injection. The pain was assessed before and after 12 weeks of treatment and improvement was labeled. The outcome was determined in terms of improvement in pain and measured on VAS (0-10, where 0 shows no pain, and 10 shows the worst pain) and improvement was labeled if there was a ≥ 50% reduction in the pain after treatment at the sixth week. All data were collected on a predesigned proforma.*
Results *The study comprised of 60 subjects with primary diagnosis of Frozen shoulder. All the recruited subjects were given Intra-articular PRP injection. Outcome of the intervention were assessed at three different timeframe intervals i.e 2, 6 and 12 weeks. Pain was assessed by VAS score (Visual analogue Scale) and improvement was labeled if there was a ≥ 50% reduction in the pain after treatment.*
Conclusion *In our study of 64 cases of frozen shoulder, all are mobilized after Intra-articular PRP injection. All the patients were evaluated at regular interval for 12 weeks by VAS and CSS score. On the basis of this study we can conclude that:*
- *There were significant improvement in pain and functional score after intervention.*
- *Intra-articular PRP injection with manipulation is safe and effective modality of the treatment for frozen shoulder.*
- *It is a cost effective procedure which can be performed on OPD basis.*

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I. Introduction

The frozen shoulder was first described by Duplay in 1872 and he hypothesized that pain and stiffness associated with frozen shoulder was linked to the peri-articular soft tissues rather than arthritis of the glenohumeral joint. Some suggest different nonoperative treatments like physical therapy, exercises, articular stretching and pulley therapy and some suggest physical therapy with medication. Intensive physical therapies

including passive stretching and manual mobilization have shown average results. Similarly, low oral corticosteroid has potential hyperglycemic effect. But, the combination of physical therapy and medication have shown better results. The justification for intraarticular PRP injection is that it decreases inflammation which leads to reduction in capsular fibrosis. This allows enhancement of joint motion and reduces the functional recovery time. Frozen shoulder mainly affects individuals 40–60 years of age, with a female predominance. The exact incidence and prevalence of frozen shoulder are unknown, but various authors have quoted [2] figures of 2%–5% in the general population .The condition affects diabetic (type 1) patients more often than healthy ones, [3] with a prevalence of almost 11% in this population group . Other conditions that have shown an association with frozen shoulder and which might give a clue to the diagnosis are the following: hyperthyroidism, hypothyroidism, hypoadrenalism, [4] Parkinson's disease, cardiac disease and a history of stroke.

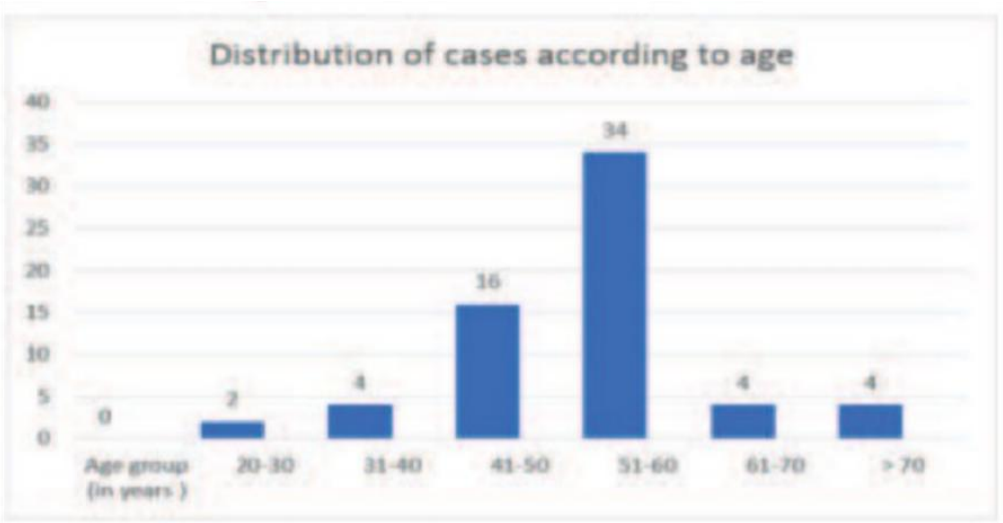
Many methods have been used for treatment of frozen shoulder. The goal of treatment is to relieve pain, improve functions, and achieve permanent recovery. Presently many peripheral regional anaesthesia techniques are practiced for pain relief. One of these techniques is inter scalene brachial plexus block which is used in shoulder surgery for anaesthesia and postoperative analgesia, with successful [5] results . Other treatment options for this condition includes, manipulation under anaesthesia, surgical intervention, intraarticular corticosteroid injections in combination with stretching protocols and the use of continues passive motion [6] devises . Recently, platelet-rich plasma (PRP) has been attracting attention as an innovative and promising procedure to stimulate repair or replace damaged tissue, due to the pools of growth factors (GFs) stored in the a-granules of platelets, which have been found to take part in the regulation of [7] damage tissue . Platelets rich plasma (PRP) contains important growth factors like platelets derived growth factors, Transforming growth factor B1, Basic fibroblastic growth factors, Vascular Endothelial Growth Factors and Epidermal Growth Factors which have shown to play important role in all [8] phases of healing . The study is being undertaken to check the efficacy of PRP in frozen shoulder patients and its possible benefits.

II. Materials And Method

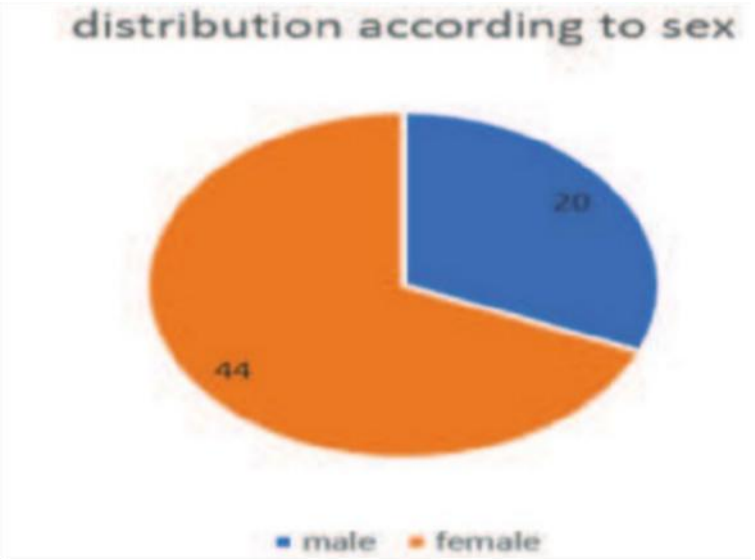
Study Design: It is an Observational study with a sample size of 60 (on the basis of previous OPD records during the period of one year). Inclusion criteria were patients of either gender aged above 40 years having U/L or B/L frozen shoulder with a duration of pain more than or equal to eight weeks. Exclusion criteria were patients with a history of previous treatment for a frozen shoulder (on medical record), patients with previous history of trauma or surgery to the concerned shoulder, systemic disorders like Rheumatoid Arthritis or any bleeding disorder, any recent history of aspirin or aspirin like drug intake, patients losing follow-ups and not completing the full treatment duration were also excluded. Patients having diabetes mellitus, pregnant or lactating females were also excluded from the study. PRP is made by collecting 20 ml of the patient's blood from the superficial saphenous vein by double syringe and centrifuging at 5000 rounds per minute (rpm) for five minutes to separate the blood into layers of red blood cells, buffy-coat of leucocytes, and plasma and lastly PRP (leucocyte rich) was collected. This preparation was injected in the subacromial bursa and intra-articular space via anatomical approach. The pain was assessed before and after six weeks of treatment and improvement was labeled. The outcome was determined in terms of improvement in pain and measured on VAS (0-10, where 0 shows no pain, and 10 shows the worst pain) and improvement was labeled if there was a $\geq$ 50% reduction in the pain after treatment at the sixth week. All data were collected on a predesigned proforma. The process was repeated weekly for four weeks. In this phase, PRP was injected only in the GH joint. Shoulder stretching exercises were recommended to the patient after every injection. The pain was assessed before and after 12 weeks of treatment and improvement was labeled. The outcome was determined in terms of improvement in pain and measured on VAS (0- 10, where 0 shows no pain, and 10 shows the worst pain) and improvement was labeled if there was a $\geq$ 50% reduction in the pain after treatment at the sixth week. All data were collected on a predesigned proforma.

III. Results

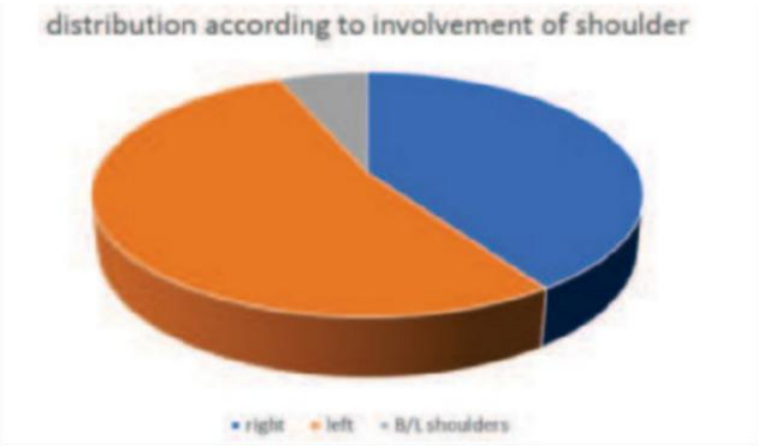
The study comprised of 60 subjects with primary diagnosis of Frozen shoulder. All the recruited subjects were given Intraarticular PRP injection. Outcome of the intervention were assessed at three different timeframe intervals i.e 2, 6 and 12 weeks. Pain was assessed by VAS score (Visual analogue Scale) and improvement was labeled if there was a $\geq$ 50% reduction in the pain after treatment.



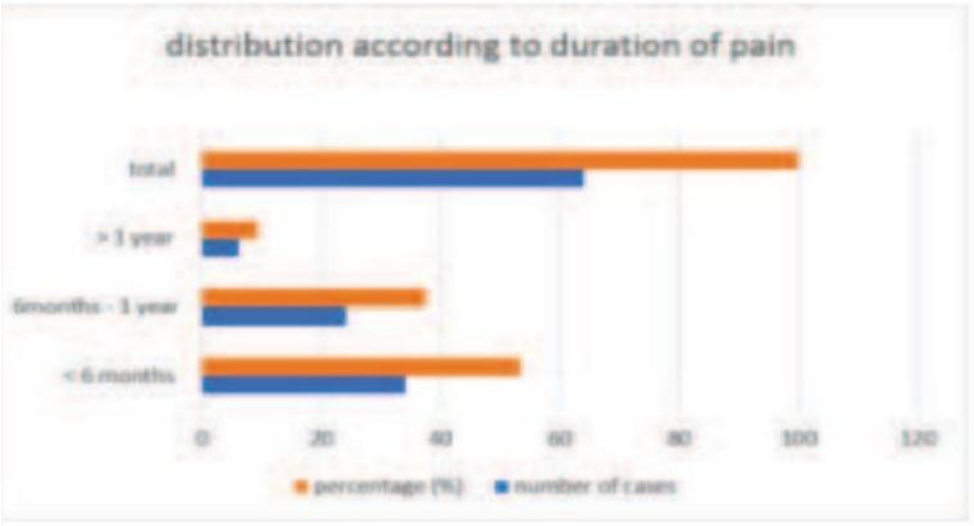
Most of the evaluated patients i.e 34 (53.12 %) were in the age group of 51-60 years, followed by 16 patients (25 %) in 41-50 years. Only two patients (3.12%) were in the age group of 20-30 years.



In our study, female patients 44 (68.75%) outnumbered male patients i.e 20 (31.25%).



Out of 64 subjects, 26 (40.62%) had pain in right shoulder, 34 (53.12%) had pain in left shoulder and 4 (6.25%) had pain in bilateral shoulders.



In our study duration of pain was less than 6 months in majority (53.12%) of cases with only 6 cases (9.38%) had pain for more than 1 year. Before intervention, 42 (65.63%) out of 64 cases had VAS score between 7-10. After intervention it was noticed that VAS score improved and 44 cases (68.75%) had 4-6 score at 2 weeks. At 6 weeks, 54 cases (84.38%) and at 12 weeks all the 64 cases had VAS score between 0-3.

Statistical evaluation of VAS score (pre and post injection)

VAS score	Number of cases		Statistical evaluation
	Pre intervention	Post intervention (12 weeks)	
0-3	2 (3.12%)	64 (100%)	$\chi 2=60.12$, $p<0.005$
4-6	20 (31.25%)	0 (0.0%)	
7-10	42 (65.63%)	0 (0.0%)	

Distribution of cases according to VAS Score at different time interval (n=64)

Number of cases				
	Pre intervention	Post intervention		
VAS Score	0 Week	2 Weeks	6 Weeks	12 Weeks
0 – 3	2 (3.13 %)	18 (28.13 %)	54 (84.38 %)	64 (100%)
4 – 6	20 (31.25 %)	44 (68.75 %)	10 (15.63 %)	0
7 – 10	42 (65.63 %)	2 (3.13 %)	0	0
Total	64	64	64	64

Grading: 0-3 Mild 4-6 Moderate 7-10 Severe

Statistical evaluation of Constant Shoulder Score (pre and post injection)

Constant Shoulder Score	Number of cases		Statistical evaluation
	Pre intervention	Post intervention (12 week)	$\chi 2=60.12$, $p<0.005$
<11	0 (0.0%)	0 (0.0%)	
11-20	52 (81.25%)	0 (0.0%)	
21-30	10 (15.62%)	0 (0.0%)	
>30	2 (3.12%)	64 (100%)	

The difference in the CSS score in pre and post intervention phase was found to be highly significant ($\chi^2=60.12$, $p<0.005$).

Distribution of cases according to Constant Shoulder Score at different time interval (n=64)

Number of cases				
Constant Shoulder Score	Pre intervention	Post intervention		
		2 week	6 week	12 week
< 11	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
11 – 20	52 (81.25%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
21 – 30	10 (15.62%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
> 30	2 (3.12%)	64 (100%)	64 (100%)	64 (100%)

Before intervention, in majority of the casesi.e 52 (81.25%%) CSS was found to be between 11-20. However in subsequent follow ups at 2 weeks, 6 weeks and 12 weeks, CSS of all the subjects i.e 64 (100%).

IV. Discussion

A total of 64 patients were included in our study with a primary diagnosis of frozen shoulder fulfilling the inclusion criteria. All the patients were mobilized followed by Intra-articular PRP injection. The mean age group of the patients in this study is 53.15

± 10.62 years. Age ranged between 20 and 80 years. Maximum numbers of patients were seen in the age group of 51- 60 years. A female preponderance was observed in this study. In the present study 44 (68.75%) subjects were female and 20 (31.25%) subjects were males, similar observation was seen by Wang JP el at in his study in which out of 63 patients 23 were male and 40 were female. In our study most of the cases were housewives, being 40 (62.5%) cases followed by farmers being 16 (25%) which may due to the fact that housewives has limited outdoor physical activities and more of sedentary lifestyle. As the incidence recorded all females were found to be performing static household activities.

Left side frozen shoulder was encountered more frequently than right side in this study. 34 (53.12%) patient had frozen shoulder of left side (non dominant) while 26 (40.62%) had right side (dominant) and 4 (6.25%) had bilateral side. Similar observations were made by Siraj M et al in their study where 113 subjects were studied out of which 47 had involvement of right shoulder (dominant) and 66 had involvement of left 9 shoulder (non dominant) .

We evaluated pain and Range of Motion till 12 weeks of intervention and the results were found to be statistically significant with $p< 0.005$. There were no complications during or after the intervention like shoulder stiffness, infection, reflex sympathetic Dystrophy, post injection are facial flushing, neurovascular damage etc

Shah Nicholas conducted a study in which 40 patients of frozen shoulder were mobilized under general anaesthesia followed by 3 doses of Steroid at regular interval. Pain and range of motion was evaluated by VAS and CSS score at a regular interval of 6 weeks and he found that there is significant improvement with a $P<0.05$ in VAS and CSS score which was similar to our study[10]

MN Rudra et al. conducted a study in which he took two groups, one with Arthroscopic release of capsule and another with intra-articular PRP injection and he found that there is significant improvement in VAS and CSS score with a $P< 0.005$ in surgical release group, although in our study we have single group of patients but we obtained statistically significant VAS and CSS score with $P<0.05$ in after mobilization under short GA followed by giving intra-articular PRP injection. Aslani H et al conducted a study in which he took two groups, one with Intra-articular steroid and another with Intraarticular Platelet rich plasma with mobilization under GA. He found a significant improvement by using a platelet rich plasma instead of steroid but in our study we obtained significant improvement in pain and shoulder movement after mobilization under short GA followed by giving intra-articular PRP injection[11]

V. Conclusion

In our study of 64 cases of frozen shoulder, all are mobilized after Intra-articular PRP injection. All the patients were evaluated at regular interval for 12 weeks by VAS and CSS score. On the basis of this study we can conclude that:-

- There were significant improvement in pain and functional score after intervention.
- Intra-articular PRP injection with manipulation is safe and effective modality of the treatment for frozen shoulder.
- It is a cost effective procedure which can be performed on OPD basis.

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