



## Comparative study of intraarticular steroid injection and normal saline for the treatment of Idiopathic frozen shoulder

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### Abstract

*Idiopathic frozen shoulder is amongst the common problems in orthopedic outpatient department which is characterized by gradual and progressive pain and stiffness of the shoulder joint followed by loss of motion and finally spontaneous recovery over the period of time. Different modalities of treatment are available for Idiopathic frozen shoulder, but none has got universal acceptability. The purpose of this study was to compare the outcome of intra-articular steroid injection and normal saline.*

**Methods:** *This was a comparative study done at Government bone and joint surgery hospital Barzulla Srinagar between April 2019 to April 2020, which included 60 patients with Idiopathic Frozen shoulder. There were 30 patients in each group. The mean age of respondent was 57.36 years. Simple Random method of sampling was adopted for selecting patients for each group. Hydroplasty group was given 30ml normal saline 4 ml 2% Lidocain (plain) and 4 ml 0.5% Bupivacain (total volume:40ml) and steroid group was given 2ml Methylprednisolone, 4ml 2% Lidocain(pain), 4ml 0.5% Bupivacain with total volume: 10 ml. Both groups were attached for therapeutic exercises. Comparison of outcomes between two treatment groups was done using Visual Analogue Scale (VAS) for pain, Shoulder Pain and Disability Index for Shoulder function and degree of range of motion.*

*Statistical analysis was done using SPSS 17.0*

**Results:** *There was significant improvement in level of pain, Shoulder function (Shoulder Pain and Disability Index) and range of motion in forward flexion, abduction, external rotation, and internal rotation in four month period in Steroid group compared to normal saline group.*

**Conclusion:** *There was a significant improvement in pain, range of movement and Shoulder Pain and Disability Index (SPADI) score in all patients of both group but the difference in improvement was found to be statistically significant in steroid injection group, So steroid injection was found to be more effective treatment modality than normal saline in idiopathic frozen shoulder in short term follow up.*

**Keywords:** *Frozen shoulder, Hydroplasty, Intrarticular steroid injection, Shoulder pain and Disability Index.*

### Introduction

The term Frozen shoulder (Adhesive Capsulitis) is a chronic condition of unknown etiology characterized by gradually progressive, painful restriction of all shoulder joint motion, with slow spontaneous restoration of either partial or

complete motion over months to year. Frozen shoulder condition is a chronic fibrosing condition of the capsule of the shoulder joint<sup>[1]</sup>. Idiopathic frozen shoulder is a commonly encountered problem in orthopedic outpatient department. The “frozen shoulder” diagnosis has been used for

many years in describing shoulder pain and limited motion, and was originally thought to be “periarthritis.” Nevasier was the first to identify the pathology through histological and surgical examination of frozen shoulder patients. The condition “Frozen shoulder” is a painful and debilitating condition with an incidence of 3% to 5% in the world population and up to 20% in those with diabetes<sup>[2-3]</sup> The term ‘frozen shoulder’ was first introduced by Codman in 1934 to describe & present a clinical condition that has been of interest to clinicians since the late 1800s<sup>[4]</sup>. Codman, when he coined the term ‘frozen shoulder’, he claimed that this disorder is ‘difficult to define, difficult to treat, and difficult to explain from pathology point of view<sup>[2]</sup>’.

Frozen shoulder is an idiopathic disease that presents itself with symptoms such as pain and decreased range of motion (ROM) of the shoulder and shoulder joint capsule fibrosis<sup>[5]</sup> leading to stiffness and disability. Research suggests that it is known to affect 2% - 5% of the general population with majority demographics being patients above 45 years of age, thus affecting individuals that are still working<sup>[6]</sup>. It is more common in women as compared to men<sup>[7]</sup>. Frozen shoulder can be either primary or secondary. Primary frozen shoulder is generally idiopathic while the secondary frozen shoulder is associated with diabetes, hemiparesis, trauma, cardiovascular disease, rotator cuff disease and impingement<sup>[8]</sup>. The treatment for frozen shoulder or idiopathic adhesive capsulitis is controversial. Common treatment options include physical therapy, corticosteroid injections and nonsteroidal anti-inflammatory drugs (NSAIDs). More invasive treatments include capsular distension, manipulation under anaesthesia and arthroscopic capsular release, but are only considered when conservative treatments fail<sup>[9]</sup>. Most patients can be managed with conservative treatment in primary care<sup>[5]</sup>. Intra-articular corticosteroid is widely used as a non-operative treatment for frozen shoulder due to its cost-effectiveness and acceptance among patients<sup>[10]</sup>. The purpose of an intra-articular steroid injection

is to relieve pain, attempt to reduce synovial inflammation to decrease capsular fibrosis and allow improvement of range of motion<sup>[7,11,12]</sup>.

### Materials and Methods

Patients with frozen shoulder were registered in our hospital from April 2019 to April 2020 and were analysed retrospectively in this study. All patients presenting with a preliminary clinical diagnosis of stage 1 or stage 2 adhesive capsulitis based on the criteria described above were treated with an intra-articular injection of local anesthetic and corticosteroid and normal saline. 60 patients were included in the study and divided into two groups of 30 patients each. 15 patients with stage 1 and 45 patients with stage 2 adhesive capsulitis. There were 26 male and 34 female patients. All patients above 40 years with primary or secondary frozen shoulder with duration of pain more than or equal to two months and that were not responding to physiotherapy were included. Patients with systemic disorders like rheumatoid arthritis, previous history of trauma or surgery to the concerned shoulder, or any bleeding disorder or any recent history of aspirin or aspirin like drug intake or history of diabetes mellitus were excluded from the study. Bilateral cases were also excluded from the study.

We injected the shoulder joint using a posterior approach using a 20-gauge spinal needle with a combination of 2 ml methyl prednisone (80 mg) plus 2 ml (1%) lignocain (total volume 10ml) in one group and other group was given 30ml normal saline 4 ml 2% Lidocain (plain) and 4 ml 0.5% Bupivacain (total volume:40ml). It was an outdoor procedure without any admissions and patients were sent home after 2 - 3 hours of observation. They were advised to do range of motion exercises for quicker recovery. Random blood sugar was done pre-injection in all the patients. All our patients received only one injection. . Range Of Motion, Visual Analogue Scale for pain (VAS) and Shoulder Pain and Disability Index (SPADI) 10 were systematically measured before the procedure and at 1 week, 1

month and 4 months after the procedure. Statistical analysis was performed using Microsoft Excel. The study was approved by the Ethical Committee.

### Results

60 patients were included in the study out of which 15 patients with stage 1 and 45 patients

with stage 2 adhesive capsulitis. 34 (56.67%) were female patients while 26 (43.34%) were male patients. The ages of the patients ranged from 43 years to 82 years with mean age of 57.36 years. Most of the patient (42%) was between age group 50-59 years. Out of 60 patients 42 (70%) had non dominant hand involvement

**Table 1** Comparison of Range of Motion (ROM) in Two Groups

Range of motion assessment	Steroid only group (mean increment in degrees±SD)	Hydroplasty group (mean degree of increment± SD)	P value
<b>Pre procedure forward flexion</b>	79.2 ± 13.71	81.2±13.2	0.517
Forward flexion at 1 week	30.6± 11.2	20.50± 6.81	0.000
Forward flexion at 1 month	56.00 ± 12.2	46.20 ± 11.0	0.002
Forward flexion at 4 months	72.0 ± 11.5	58.2 ± 12.0	0.006
<b>Pre procedure abduction</b>	58.20 ± 9.68	63.2 ± 10.28	0.147
Abduction at 1 week	37 ± 5.92	28 ± 7.2	0.000
Abduction at 1 month	68± 10.90	56± 11.6	0.001
Abduction at 4 months	85±13.60	75± 13.8	0.002
<b>Pre procedure internal rotation</b>	3.64± 1.42	3.14± 1.10	0.193
Internal rotation at 1 week	3.30± 0.6	2.90± 5.4	0.008
Internal rotation at 1 month	6.8± 0.94	5.8 ± 1.12	0.006
Internal rotation at 4 months	8.6± 0.94	5.8± 1.12	0.004
<b>Pre procedure external rotation</b>	12.2 ±8.6	10.8 ± 7.5	0.699
External rotation at 1 week	10.4± 3.9	6.2 ± 2.3	0.000
External rotation at 1 month	19.2± 4.0	15.2± 4.2	0.001
External rotation at 4 months	36.20 ± 8.5	30.10± 1.10	0.016

We observed gradual improvement in Range of motion from day one to four months. There was significant improvement in steroid group compared to hydroplasty group. Range of movement in both group before the procedure was

statistically not significant but after procedure there was statistically significant differences between two groups at day one to 4 months periods (P value <.05).

**Table 2:** Comparison of Shoulder Pain Disability Index at different time between two groups

Assessment of shoulder disability	Steroid group (mean reduction in SPADI score $\pm$ SD)	Hydroplasty group(mean reduction in SPADI score $\pm$ SD)	P value
SPADI pre procedure	7.21 $\pm$ 0.40	7.20 $\pm$ 0.41	0.24
SPADI 1 week	2.65 $\pm$ 0.53	2.12 $\pm$ 0.63	0.05
SPADI 1 month	5.30 $\pm$ 0.85	4.61 $\pm$ 0.91	0.048
SPADI 4 months	6.49 $\pm$ 0.81	5.53 $\pm$ 1.2	0.037

Shoulder Pain Disability Index difference was not statistically significant between two groups before procedure but difference of reduction in the

SPADI score was statistically significant (P value  $<$ .05) in one month and 4 month follow up.

**Table 3:** Comparison of visual analogue scale at different time between two groups

Assessment pain score	Steroid group (Mean reduction in pain score $\pm$ SD)	Hydroplasty group (mean reduction in pain score $\pm$ SD)	P value
VAS pre procedure	6.54 $\pm$ 0.82	6.86 $\pm$ 0.71	0.15
VAS 1 week	2.72 $\pm$ 0.71	2.02 $\pm$ 0.56	0.05
VAS 1 month	2.62 $\pm$ 0.73	5.02 $\pm$ 0.76	0.04
VAS 4 months	6.16 $\pm$ 0.53	5.42 $\pm$ 0.84	0.028

Visual analogue scale was not statistically significant between two groups before procedure, which was found to be significant (P value  $<$ 0.05) after procedure in 1 month and 4 months period

### Discussion

In our comparative study, total 60 patients who met our inclusion criteria were selected for the procedure. Among the fifty patient 34(56.67%) were female and 26(43.34%) were male. Most of the patient (42%) was between age group 50-59 years. The mean age of respondent was 57.36 years and 42 (70%) of the patient in this study had non dominant hand involvement.

The staging system for adhesive capsulitis was initially described by Neviaser and Neviaser<sup>[13]</sup>. They suggested four stages that ranged from synovial inflammation with limited motion to adhesive synovitis, to more mature adhesions with less synovitis, and finally to mature adhesions with limited motion.

Dudkiewicz., et al.<sup>[8]</sup> presented a study in 2004 of 54 patients with mean follow up of 9.2 years. They claimed that conservative treatment for frozen shoulder i.e. physiotherapy and intra-articular steroid injection was an effective long term treatment method. But he did not cover the

correlation of the treatment method with the duration of lasting symptoms and patient treatment histories. Hazleman., et al.<sup>[14]</sup> in his study then summarized numerous research papers on the use of intraarticular corticosteroid injections and concluded that the success rate of the treatment depended primarily on the duration of symptoms. His results suggested that if the treatment was initiated within 5 months from the onset of symptoms then the patients would recover in around 8.1 months.

Bulgen., et al.<sup>[15]</sup> in his study compared results of patients with frozen shoulder treated with physical therapy, ice, intra-articular steroid injection and benign neglect. He found that the short term results were well in patients with steroid injections, but in long term follow-ups, statistically there was no difference found in pain and ROM of these patients.

Robert G Marx., et al.<sup>[4]</sup> retrospectively studied patients with stage 1 or stage 2 adhesive capsulitis. He hypothesised that the use of intra-articular corticosteroid injection in the early stages of idiopathic adhesive capsulitis would lead to a rapid resolution of stiffness and symptoms. He too in line with the theory that the treatment option would be decided by the length of symptoms

suggested that Patients who were treated in stage 1 recovered more rapidly than those in stage 2 and corticosteroid injection in the early stages of adhesive capsulitis allowed the patient to regain motion prior to developing severe fibrosis in many cases.

Sharma RK., et al. <sup>[16]</sup> in his paper presented 32 patients suffering from frozen shoulder that had not improved with physiotherapy. He treated them by using manipulation under general anesthesia or by steroid injection and hydraulic distension under local anaesthesia. He reported his results and recommended distension technique, as it was easier and gave better results than manipulation. Following this, Singh GP., et al. <sup>[17]</sup> also studies the benefits of hydraulic distension technique to patients suffering from frozen shoulder. He presented 88% excellent results with hydraulic distension technique and recommended that patients with frozen shoulder should be treated with hydraulic distension under local anaesthesia with steroid

A study by Mussa M., et al. <sup>[18]</sup> in 2016 presented a group of 60 patients with idiopathic adhesive capsulitis and compared their preoperative and postoperative scores using VAS Scores. According to their findings the VAS Score improved from 7 pre-operatively to 2 in the 6 months post-operative follow up.

Another study by Rawat MS., et al. <sup>[19]</sup> conducted in 2018 presented a group of 32 patients with idiopathic adhesive capsulitis and compared their preoperative and postoperative scores using VAS Scores and CSS. According to their findings the VAS Score improved from 7 - 10 pre-operatively to 0 - 3 in the 3 months post-operative follow up and the CSS improved drastically in 3 months. Our study reported the same trend as both these studies with the VAS and CSS score improving from 7.67 and 16.67 preoperatively to 2.89 and 43.41 in their 3 month postoperative follow up respectively. Therefore, our results directly support their inference that Local intra-articular steroid injection is effective in relieving pain and improving range of motion of patients with frozen

shoulder. Limitations included that our sample size was small and we did not have a control group. Another limitation of this research is that it is impossible to know with certainty that all injections were indeed intra-articular despite the surgeon being well experienced.

### Conclusion

On the basis of this study we can conclude that, Local intra-articular steroid injection is effective and safe for patients with idiopathic adhesive capsulitis and improves range of motion and relieves pain. Longer follow up period is required to access the benefits of the condition over the Long term. There was improvement in pain, range of movement and Shoulder Pain and Disability Index (SPADI) score in all patients of both group but the difference in improvement was found to be statistically significant in steroid injection group as compared to hydroplasty group. So steroid injection was found to be more effective treatment modality than hydroplasty in treatment of idiopathic frozen shoulder.

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