# A STUDY OF FUNCTIONAL OUTCOME OF FROZEN SHOULDER TREATMENT BY ARTHROGRAPHIC HYDRODILATATION AND INTRAARTICULAR STEROID INJECTION

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ABSTRACT

## BACKGROUND

There is a wide variety of treatment modalities available for the self-limiting disease of the frozen shoulder. But, there is no definite evidence of superiority available one over the other. This study was planned to evaluate the functional outcome of combined hydraulic capsular distension by normal saline and intraarticular steroid injection followed by physiotherapy for treatment of frozen shoulder.

## MATERIALS AND METHODS

64 patients between age group of 45 to 70 years, that attended our Orthopaedic Department OPD for primary frozen shoulder between January 2012 to December 2016 were included in this study. They were divided into 2 groups. First group of patients (32) were treated with combined intracapsular distension of shoulder using normal saline and intraarticular steroid injection under local anaesthesia followed by physiotherapy. Three doses were given at interval of 2 weeks. Second group (32 pts.) were treated by analgesics and physiotherapy only. The patients were assessed at baseline, second week, sixth week, twelfth week and sixth months. All the patients were evaluated for functional improvement by measuring the range of active movement of shoulder.

## RESULTS

Patients treated with arthrographic hydrodilatation and intraarticular steroid injection have significantly better functional outcome in second week of injection as evaluated by active range of movement of shoulder.

## CONCLUSION

From this study, we concluded that arthrographic hydrodilatation by normal saline combined with intraarticular steroid injection under local anaesthesia followed by physiotherapy provided dramatic pain relief and improved shoulder movement as early as second week.

## **KEYWORDS**

Frozen Shoulder, Arthrographic, Hydrodilatation, Normal Saline, Physiotherapy, Intraarticular Steroid Injection.

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## BACKGROUND

Frozen shoulder is a self-limiting condition of unknown aetiology characterised by pain and restriction of shoulder joint motions, which is gradually progressive in nature.<sup>1</sup> It takes months to years for slow recovery of pain and joint movement.<sup>2,3</sup> Codman described this condition first in 1934 as frozen shoulder, which is difficult to define, difficult to treat and difficult to explain as pathological point of view. Periarthritis and adhesive capsulitis have been used simultaneously with frozen shoulder. This can be primary or maybe associated with another secondarily systemic illness

Financial or Other, Competing Interest: None. Submission 16-05-2017, Peer Review 29-05-2017, Acceptance 03-06-2017, Published 12-06-2017. Corresponding Author: Dr. Basanta Kumar Behera, Associate Professor, Department of Orthopaedics, Kalinga Institute of Medical Sciences, Bhubaneswar. E-mail: basantaorth@gmail.com DOI: 10.18410/jebmh/2017/572 or post trauma. Both have similar clinical presentation. Incidence of frozen shoulder is around 2% between 40-70 years. Diabetes mellitus is common after 40 years and 10-20% of these patients are suffering from frozen shoulder. Even many patients, first present with early frozen shoulder and on test they are found to be suffering from DM.

Other conditions, which are excluded from frozen shoulder are post-traumatic fracture around shoulder, arthritis of shoulder, dislocation of shoulder, cervical spondylosis, calcified tendinitis, supraspinatus tendinitis, bicipital tendinitis and subacromial impingement syndrome. All these conditions should be excluded by doing good clinical examination.

Many treatment options are available for frozen shoulder.<sup>4</sup> These include drug, physiotherapy, intraarticular steroid injection, arthrographic hydrodilatation, manipulation under general anaesthesia and arthroscopic surgical release. But, there is no definite treatment and consensus regarding single best treatment modality.<sup>5</sup> Treatment with intraarticular steroid injection may reduce

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the inflammation.<sup>6</sup>Steroid injection with physiotherapy is effective in reducing pain and improves shoulder joint movement. But, it takes longer time to improve. Treatment with large volume of normal saline injection into shoulder joint breaks down the adhesion of capsule and distends the capsule to develop an anatomical plane of motion and decreases the amount effort required for physiotherapy.

Because of variable nomenclature different types of treatments have created a confusion,<sup>7</sup> chronic pain and stiffness of shoulder makes the patient disappointed.

Therefore, we have done this prospective study and compared 2 modalities of treatment, i.e. intraarticular steroid injection combined with 50 mL of normal saline and followed by physiotherapy and physiotherapy only in terms of pain relief and early improvement of stiffness of shoulder.

## MATERIALS AND METHODS

We have done this prospective and randomised study and evaluated total 64 patients of frozen shoulder between age group of 45 to 70 years that attended our Orthopaedic Department OPD between January 2012 to December 2016. There were 44 F patients and 20 M patients. The diagnosis was done clinically with patient having pain and stiffness of shoulder and unable to perform their routine activities for more than 1-2 months. History of recent trauma, previous disease like arthritis of shoulder due to different inflammatory condition were excluded in this study. Normal x-ray of shoulder was done to rule out any fracture or disease in shoulder joint. Blood test was done to know status of diabetes mellitus.

We have divided patients into 2 groups. Group 1 (32 patients) were treated with normal saline hydrodilatation

and intraarticular steroid injection followed by physiotherapy. Group 2 (32 patients) were treated with analgesic and physiotherapy only.

### GROUP-1

Under sterile condition and with 5 mL of local Xylocaine infiltration, the shoulder joint space was entered at a point just inferior to angle of acromion posteriorly 2% of 2 mL Xylocaine and 2 mL of Depo-Medrol was injected into the shoulder joint. Then, 50 mL of normal saline was injected into joint by 18 G needle. The distention was continued till resistance was felt. Then, physiotherapy was started under supervision for 1 week and then it is followed in home. This injection was repeated at interval of 2 weeks up to total of 3 doses, if there was no pain relief.

#### GROUP-2

In this group, patients were treated with short period of analgesics and continued physiotherapy only under supervision in first week and then followed by home exercise till 12 weeks.

Patients of both groups were called for follow up at second week, sixth week, twelfth week and sixth months. Patients in both groups were evaluated for functional improvement in stiffness by measuring active range of movement and relief of pain.

### RESULTS

Patient treated with arthrographic hydrodilatation and intraarticular steroid injection have significantly better functional outcome in second week of injection as evaluated by active range of movement of shoulder.

	Forward Flexion	Abduction	External Rotation	Internal Rotation
Baseline				
Group-1	66.20 ± 18.20	64.20 ± 17.85	11.26 ± 5.24	15.62 ± 4.20
Group-2	64.26 ± 19.30	55.25 ± 14.55	$10.36 \pm 3.72$	$12.60 \pm 3.73$
2 <sup>nd</sup> Week				
Group-1	90.40 ± 20.62	88.62 ± 20.42	17.62 ± 5.24	27.12 ± 4.92
Group-2	70.76 ± 22.34	66.52 ± 18.24	$14.28 \pm 4.24$	23.30 ± 3.24
6 <sup>th</sup> Week				
Group-1	98.76 ± 23.20	96.72 ± 14.24	26.18 ± 5.28	33.88 ± 6.58
Group-2	74.64 ± 20.17	72.76 ± 15.20	18.12 ± 3.22	25.28 ± 5.12
3 <sup>rd</sup> Month				
Group-1	$110.12 \pm 15.20$	128.82 ± 14.20	28.15 ± 5.15	39.82 ± 7.24
Group-2	82.14 ± 14.17	80.72 ± 15.32	20.14 ± 3.52	27.78 ± 5.12
6 <sup>th</sup> Month				
Group-1	140.26 ± 15.20	138.52 ± 18.26	33.10 ± 6.26	48.82 ± 3.78
Group-2	84.15 ± 9.86	82.46 ± 16.12	23.98 ± 2.76	28.76 ± 2.60
Table 1. Improvement in Active range of motion between two Groups:				

The value are express as mean  $\pm$  standard deviation.

### DISCUSSION

Literature for frozen shoulder reveals that it is relatively common disorder, which left untreated will result in significant pain and stiffness for period upto months to year after. There are many method of management of frozen shoulder that include physiotherapy, intraarticular steroid injection, arthrographic hydrodilatation, manipulation under anaesthesia and arthroscopic release.

Arthrographic hydrodilatation with normal saline and intraarticular steroid injection role for treatment has been already proven.<sup>8</sup> Physiotherapy helps by improving joint and soft tissue mobility.<sup>9</sup> Improvement of pain and stiffness by physiotherapy only is comparatively less and delayed.<sup>10</sup> Intraarticular steroid injection gives a good pain relief by reducing inflammation of capsule and its surrounding structure, but studies have shown that this effect is short lasting with repeated steroid injection alone has found to be less effective is improving range of motion.<sup>6,11</sup> A forceful distension of intracapsular adhesion strips and the capsule from bone attachment and sometimes causes capsular rupture, thus improving the pain and stiffness of shoulder joint.<sup>12,8</sup> There are few studies that<sup>8,13,14</sup> have combined the two modalities of treatment, but there is hardly any study, which has evaluated the combined effect of all 3 modalities of treatment, i.e. hydrodilatation steroid injection and physiotherapy, which have been done in our study.

We have used 50 mL of normal saline for capsular distension as done by Ghauri et al.

We used 3 doses of hydrodilatation and steroid injection at an interval of 2 weeks as done by Elnaer K. et al.<sup>13</sup>

No patient developed any complication related to hydrodilatation as study by Ghauri S. et al. $^{15}$ 

In this randomised prospective study, we have evaluated 64 patients of frozen shoulder in the age group of 45 to 70 years. There is documented relationship between DM and frozen shoulder with incidence reported to be 10%-30% in our study. We found 22 out of 64 patients were diabetic. In our study, after first injection, 90% patients got immediate pain relief by 1-2 weeks. But, this did not happen with patient taking only physiotherapy.

In comparative study by Ghauri S, it was observed that all patients with hydrodilatation steroid injection and physiotherapy achieved immediate pain relief and improvement in stiffness and good night sleep.<sup>15</sup> Shall M study showed that out of 20 patients treated with hydrodilatation 17 (85%) had no pain at the end of first week, which is comparable to our study.<sup>16</sup>

Lyn Watson in his study, hydrodilatation and steroid injection for frozen shoulder observe maximum benefit in 3-7 days and persist till 6 months of follow up.

In study of Carvy and Haverson, it was observed that 15 out of 21 patients show significant pain relief by first week of hydrodilatation.

Carelte S in his study showed that steroid injection and physiotherapy or hydrodilatation and steroid injection gives better result than steroid injection alone or physiotherapy alone.

In the comparative study between hydrodilatation and intraarticular steroid injection by Ghauri S observed 88% patient had excellent result regarding their functional outcome at the end of 45 days.<sup>15</sup>

## CONCLUSION

From this study, we concluded that treatment of frozen shoulder by hydrodilatation with normal saline and intraarticular steroid injection followed by physiotherapy provide dramatic pain relief and stiffness of shoulder as early as first to second week and remains sustained while physiotherapy only provides delayed pain relief and improve movement of shoulder. We also conclude that benefits of hydrodilatation remains persistently superior with respect to physiotherapy alone as maximum patients receiving hydrodilatation returns to normal activities by 3 months. Small sample size and no long-term followup remains the limitation of study. This procedure of hydrodilatation combine with steroid injection into joint is safe procedure and provide pain relief, improve range of motion and is most effective intervention in the management of frozen shoulder.

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