

ORIGINAL ARTICLE

Comparison between Hydro Dilatation and Intra Articular Steroid Injection in Patients with Frozen Shoulder in Term of Pain Relief and Range of MovementRaja Adnan Ashraf¹, Sohail Iqbal Sheikh², Nabeel Sabir³

ABSTRACT

Objectives: To compare the effect of intra articular steroid injection and hydro dilatation of the shoulder joint to improve disability and pain management in adhesive capsulitis.

Study Design: Randomized controlled trial.

Place and Duration of Study: The study was carried out at the department of Orthopaedics, from 25th June 2017 to 24th July 2018.

Materials and Methods: Diagnosed cases of Adhesive Capsulitis in outpatient clinic of Orthopaedics from both genders were part of the study. A total of 30 patients presented in Orthopaedics outpatient department were randomized into 2 groups by lottery method; group A received Intra-articular steroid injection and group B was treated with hydraulic dilatation of the glenohumeral joint. Both groups received regular, supervised physiotherapy sessions during follow up visits. Patient's pain scores and range of mobility were observed over a period of twelve weeks. Follow up reviews were done at intervals of 2, 6, 8 and 12 weeks. Data analysed with SPSS version 23.

Results: Total 18 female and 12 male patients were included in analysis. Results were categorized into excellent, good, fair and poor, over parameters like Visual Analogue Scale and range of motion (ROM). During follow up visits, 4% of patients from Group A and 36% of the patient from Group B had excellent, 56% from Group A and 34% from Group B had good, 26% from Group A and 24% from Group B had fair, while 14% from Group A and only 6% from Group B had poor results. Group B showed significantly improved pain scores and mobility.

Conclusion: Based on results of our study, distension of glenohumeral joint with normal saline in patients of frozen shoulder produces significant pain relief and improves range of motion as compared to intra articular steroid injection.

Key Words: *Adhesive Capsulitis, Hydrotherapy, Intra-Articular Injection.*

Introduction

Adhesive Capsulitis is a commonly prevalent shoulder joint pathology among adult population.¹ In diabetics the incidence is nearly 20% while in general population an overall prevalence ratio is 3-5%.² Females have higher incidence than males during their fourth to sixth decade of life.³ This is a chronic condition and its exact aetiology remains unknown.⁴

It is characterized by the formation of adhesions at the synovium and capsule of the shoulder joint due some sort of inflammation and the primary site of adhesions is the axillary fold, junction of capsule and anatomical neck of humerus.⁵

Different treatment options are available for frozen shoulder with individual limitations.⁶ Manipulation under anaesthesia (MUA) is frequently used treatment modality for frozen shoulder syndrome but is associated with risks such as fracture of the humerus, rotator-cuff tears, and tears of the labrum or injury to the brachial plexus.⁷ Intra articular steroid injection may benefit some patients.⁸ Arthroscopic release under anaesthesia is invasive procedure with restricted known benefits.⁹ Intensive physical therapy has slow outcomes in improvement of range of motion.¹⁰ Home exercise regimens do not show any significant betterment in natural recovery.¹¹ Besides above mentioned treatments, there are documented literary evidences in favour of hydro

^{1,2}Department of Orthopaedics
Islamic International Medical College
Riphah International University, Islamabad

³Department of Orthopaedics
Benazir Bhutto Hospital, Rawalpindi

Correspondence:

Dr. Raja Adnan Ashraf
Assistant Professor
Department of Orthopaedics
Islamic International Medical College
Riphah International University, Islamabad
E-mail: dr.addi79@yahoo.com

Funding Source: NIL; Conflict of Interest: NIL

Received: May 28, 2019; Revised: August 26, 2019

Accepted: August 27, 2019

dilatation method for treatment of frozen shoulder.¹² After hydro dilation, there is lesser degree of disability and better outcome for the patients.¹³ Simon Bell et al in his study demonstrated hydro dilatation of the shoulder as a very effective management option in adhesive capsulitis. It involves the technical ability to get maximum distension.¹⁴ In the literature there is no evidence that suggest specific subgroup in the population have an increased risk of frozen shoulder compare with other population.¹⁵

The rationale of this study is to apply, assess and promote the use of hydro dilation therapy in the management of adhesive Capsulitis in our practice if the results are favourable, because technically it is easier and safe and there is limited research data available on this modality of treatment in our country, while it is being practiced successfully in other parts of the world. Also theoretically there is less chance of morbidity like infection with the use of this method as compared with steroid injection. Thus this study was carried out to compare the effect of intra articular steroid injection and hydro dilatation of the shoulder joint to improve disability and pain management in Adhesive Capsulitis.

Materials and Methods

A randomized controlled study conducted in Orthopaedic outpatient department of Pakistan Railways General Hospital, Rawalpindi between 25th June 2017 and 24th July 2018 for a period of 13 months. Study was commenced after being approved from the ethical board committee of the hospital. Selected patients were given written informed consent. 30 patients ranging from 40-60 years of age who presented with frozen shoulder having pain, stiffness, limited range of motion (ROM) for a minimum of two months without any prior history of trauma were included in the study on the basis of convenience sampling. 30 diagnosed patients of Adhesive Capsulitis were randomized into 2 groups by lottery method. Group-A patients (n=15) received Intra-articular steroidal injection while group B (n=15) were managed with hydro dilatation. The clinical assessment was recorded on study performa by the researcher trainee. After the injection, all patients were advised domestic physiotherapy sessions. Patients were on regular follow up in outpatient department for three months

after 2, 6, 8 and 12 weeks.

Patients having serious pathologies like previous fracture of ipsilateral humerus, rheumatoid arthritis, osteoarthritis of shoulder, having major medical disorders, immunocompromised and history of allergic reaction to local anaesthetics were left out of the study. Data analysed with SPSS version 23.

The patient evaluation was done on the parameters of pain as assessed on visual analogue pain scoring and range of motion assessed in degrees of arc.

Intra-articular Injection: Patient was placed supine over a table with supporting pillow under opposing shoulder. Portal of entry was marked on skin by a pen at the point 3-cm inferior and 1-cm medial to postero-lateral tip of acromion. All septic measures were properly taken. A mixture of 1cc 2% Lidocaine HCl and 2 ml (80mg) methylprednisolone acetate was injected through conventional posterior route for arthroscopy of shoulder. After successfully traversing the posterior soft spot between teres minor and infraspinatus muscles, a 22 gauge spinal needle was inserted with tip pointing anteriorly toward coracoid process. The position was checked frequently and mixture was injected slowly to achieve maximum possible joint infiltration.

Technique of Hydraulic Distension: Under aseptic measures, a 22-gauge, 3.5 inch needle was inserted superior to anatomical neck of humerus and injection was given under joint abducted to 90 degree and main joint flexed to 90 degree.¹⁵ 4-ml local anaesthetic inserted mixed with 50-mL normal saline. Fluid was infiltrated slowly inside. This results in a loss of resistance. The needle was then removed. Rupture occurred in almost all patients receiving hydrotherapy.



Fig 1: Water Being Injected for Hydrodilatation

During preliminary interviewing, pain levels and mobility range were recorded and progressive records were maintained at intervals of 2, 6, 8 and 12 weeks respectively. The level of pain subjectively was measured using VAS while performing shoulder joint movements with 10 being the upper limit of pain and 0 consider as no pain. ROM was calculated with a goniometer in abduction and external rotation planes. Data was collected in the form of variables and analysed using SPSS version 23. Percentages were calculated for qualitative data i.e., gender. Chi-square test was employed for comparing the differences between the clinical assessments in 2 groups. P-value < 0.05 was considered statistically significant.

Results

Results were categorized into excellent, good, fair and poor, over parameters like Visual Analogue Scale and range of motion (ROM). During follow up visits, 4% of patients from Group A and 36% of the patient from Group B had excellent, 56% from Group A and 34% from Group B had good, 26% from Group A and 24% from Group B had fair, while 14% from Group A and only 6% from Group B had poor results. Group B showed significantly improved pain scores and mobility. The mean pain level in group A before intervention was 9 that reduced to a mean level of 4 while in Group B the pain level before intervention was 8 that reduced to mean of 2 pain level.

At baseline, there was insignificant difference was between the groups in terms of VAS and ROM. Pain improved markedly during all times of follow up particularly in group B. Range of active motion showed no notable variation at the base time between two groups. During Outpatient follow ups, at 4 regular intervals, abduction, flexion and external rotation showed significant difference between the groups with gradual improvement from week 2 to 8. No complication occurred in hydro dilatation group, while 3 patients receiving intra-articular steroidal injection complained of anterior shoulder pain. 5 patients from group A complained that pain took 2 to 3 days to settle. Only one patient from group B reported post distension symptom flare up, which settled within 48 hours. There was no marked difference between level of pain and disability scoring between frozen shoulder patients with and without diabetes initially, though long term

improvement was found significantly better in diabetic patients who received hydro dilatation.

Table I. Mean ROM Pre-Hydro Dilatation in all Subjects n (30)

Aetiology Capsulitis	Patient Numbers (n=30)	External Rotation	Glenohumeral Abduction	Active Elevation
Group A	15	25-56	55-81	113-152
Group B	15	28-62	60-80	124-154

Table II: Mean ROM Post-Hydro Dilatation (HD) in all Subjects n(30)

Aetiology Capsulitis	Patient Numbers (n=30)	External Rotation	Glenohumeral Abduction	Active Elevation
Group A	15	45-76	75-130	133-162
Group B	15	42-68	80-120	128-158

Discussion

According to our results patients treated who were offered hydro dilatation for the treatment of Adhesive Capsulitis showed significant improvement as compared to the other group treated with intra articular steroid injection. Gam et al. demonstrated marked improvement in ROM in patients managed using hydro distension with corticosteroid compared with the corticosteroid alone.¹⁶ In one of the studies undertaken by Harris et al. he was unable to find significant difference between groups. Conclusion however cannot be drawn, although mean improvement was similar in both groups.¹⁷ In one study, ROM was almost equal in the two groups at follow-up, a result in accordance with Corbeil et al.¹⁸ This lack of difference between groups may be due to inadequate hydro dilatation. In our study, a volume of around 50 ml was used with the actual volume infiltrated depending on distensibility of the capsule before rupturing. Other researchers have been using large amount of fluid, like Buchbinder et al. who on average infiltrated 43 ml.¹⁹

Various researchers have recommended hydro dilatation procedure based on results which were obtained with a standardized physiotherapy protocol.^{20,21,22} In our study, all patients were subjected to a physiotherapy protocol. The frequency of injections infiltrated in our study was dependent upon previous studies done in the literature.^{23,24} Most of the studies in literature have opted for a single injection trial. Some employed 3 injections, while Gam et al. reported infiltrating a total of 6 injections. Though under-powered, Gam's study showed that dilatation is superior to simple

injection by providing an improved ROM.²⁵ However, infiltrating 3 injections rather than one may have been unfortunate given the objective of study to identify the treatment effectiveness of hydro dilatation. There are chances that a corticosteroid injection may be causing improvement in this disease. Repeated injections may add up to this, creating a small margin for improvement. Whether hydro dilatation effects are cumulated if these infiltrations are repeated is still a topic of debate. It is rather a possibility that the effects of hydro dilatation might have been identified easily, if only a single injection was infiltrated.

The findings in our study are in favour of the use of hydro dilatation of the shoulder joint in comparison to intra-articular steroids in Adhesive Capsulitis. In addition, patients in group B revealed significantly better ROM plus better pain scores. Effects of hydrotherapy lasted much longer than the other group. Hydro dilatation was without complications and patients tolerated it very well. Hydro dilatation is a rather cost effective and better treatment modality when compared with intra-articular steroids, with minimal risk of complications. Study limitation included less number of patients in both groups with a minor trend of poor follow up.

Our study is however limited in terms of duration of the patients follow-up and further research must be encouraged in terms of long-term outcome of the patients treated with hydrotherapy for the management of Adhesive Capsulitis.

Conclusion

Capsular hydro dilatation compared with intra articular steroid injection improves outcome in Adhesive Capsulitis more effectively and can offer prompt improvement in range of motion. It can be employed as the first line intervention in the treatment of Adhesive Capsulitis targeting both pain relief and restoration of range of motion.

REFERENCES

1. Lin MT1, Hsiao MY2, Tu YK3, Wang TG1. Comparative Efficacy of Intra-Articular Steroid Injection and Distension in Patients with Frozen Shoulder: A Systematic Review and Network Meta-Analysis. 2018 Jul;99(7):1383-1394.
2. Kyung-Hee Kim,a Jung-Woo Suh,b and Ki Young Ohb. The effect of intra-articular hyaluronate and tramadol injection on patients with adhesive capsulitis of the shoulder. 2017; 30(4):913–920.
3. S. Rymaruk1 and C. Peach1. Indications for hydrodilatation for frozen shoulder. 2017 Nov; 2(11):462–468.
4. Wang W1, Shi M, Zhou C, Shi Z, Cai X, Lin T, Yan S. Effectiveness of corticosteroid injections in adhesive capsulitis of shoulder: A meta-analysis. 2017 Jul;96(28):e7529.
5. Buchbinder R, Hoving JL, Green S, Hall S, Forbes A. Short course prednisolone for adhesive capsulitis (frozen shoulder or stiff painful shoulder): a randomised, double blind, placebo controlled trial. *Ann Rheum Dis*. 2004; 63: 1460-1469.
6. Rangan A, Hanchard N, McDaid C. What is the most effective treatment for frozen shoulder?. *BMJ*. 2016 Aug 23;354.
7. De Palma AF. Loss of scapulohumeral motion (frozen shoulder). *Clin Orthop Relat Res*. 2008; 466(3):552–60.
8. Lee JC, Sykes C, Saifuddin A, Connell D. Adhesive capsulitis: sonographic changes in the rotator cuff interval with arthroscopic correlation. *Skeletal Radiol*. 2005; 34(9):522–7.
9. Mengiardi B, Pfirrmann CW, Gerber C, Hodler J, Zanetti M. Frozen shoulder: MR arthrographic findings. *Radiology*. 2004; 233(2):486–92.
10. Rutten MJ, Collins JM, Maresch BJ, Smeets JH, Janssen CM. Glenohumeral joint injection: a comparative study of ultrasound and fluoroscopically guided techniques before MR arthrography. *Eur Radiol*. 2009; 19(3):722–30.
11. Depelteau H, Bureau NJ, Cardinal E, Aubin B, Brassard P. Arthrography of the shoulder: a simple fluoroscopically guided approach for targeting the rotator cuff interval. *AJR Am J Roentgenol*. 2004; 182(2):329–32.
12. Robinson CM, Seah KT, Chee YH, Hindle P, Murray IR. Frozen shoulder. *J Bone Joint Surg*. 2012;94(1):1–9
13. Smith CD, Hamer P, Bunker TD. Arthroscopic capsular release for idiopathic frozen shoulder with intra-articular injection and a controlled manipulation. *Ann R Coll Surg Engl*. 2014; 96:55–60.
14. Hsu JE, Anakwenze OA, Warrender WJ, Abboud JA. Current review of adhesive capsulitis. *J Shoulder Elbow Surg*. 2011; 20:502–514.
15. Debeer P, Franssens F, Roosen I. Frozen shoulder and the Big Five personality traits. *J Shoulder Elbow Surg*. 2014; 23:221–226.
16. Jerosch J, Nasef NM, Peters O, Mansour AM. Mid-term results following arthroscopic capsular release in patients with primary and secondary adhesive shoulder capsulitis. *Knee Surg Sports Traumatol Arthrosc*. 2013;21:1195–1202
17. Le Lievre HM, Murrell GA. Long-term outcomes after arthroscopic capsular release for idiopathic adhesive capsulitis. *J Bone Joint Surg*. 2012;94:1208–1216.
18. Waszczykowski M, Fabiś J. The results of arthroscopic capsular release in the treatment of frozen shoulder - two-year follow-up. *Ortop Traumatol Rehabil*. 2010;12:216–224
19. Cinar M, Akpınar S, Derincek A, Cerci E, Uysal M. Comparison of arthroscopic capsular release in diabetic and idiopathic frozen shoulder patients. *Arch Orthop Trauma Surg*. 2010; 130:401–406.
20. Baums MH, Spahn G, Nozaki M, Steckel H, Schultz W. Functional outcome and general health status in patients

- after arthroscopic release in adhesive capsulitis. *Knee Surg Sports Traumatol Arthrosc.* 2007; 15:638–644.
21. Quraishi NA, Johnston P, Bayer J, Crowe M, Chakrabarti AJ. Thawing the frozen shoulder. A randomised trial comparing manipulation under anaesthesia with hydrodilatation. *J Bone Joint Surg Br.* 2007; 89:1197–1200.
22. Smith CD, Hamer P, Bunker TD. Arthroscopic capsular release for idiopathic frozen shoulder with intra-articular injection and a controlled manipulation. *Ann R Coll Surg Engl.* 2014; 96:55–60.
23. Jerosch J, Nasef NM, Peters O, Mansour AM. Mid-term results following arthroscopic capsular release in patients with primary and secondary adhesive shoulder capsulitis. *Knee Surg Sports Traumatol Arthrosc.* 2013; 21:1195–1202.
24. Tighe CB, Oakley WS. The prevalence of a diabetic condition and adhesive capsulitis of the shoulder. *South Med J.* 2008; 101:591–595.
25. Klinger HM, Otte S, Baums MH, Haerer T. Early arthroscopic release in refractory shoulder stiffness. *Arch Orthop Trauma Surg.* 2002; 122:200–203.
-