

Hydrodilatation and Intra-articular Steroid Injection are Both Effective in Management of Frozen Shoulder: A case series

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Abstract

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Background: Frozen shoulder is a common problem in general orthopaedic practice, affecting about 2% of the population. Intra-articular corticosteroids (IA) and hydrodilatation have been reported as more effective among other conservative treatments. However, it is unclear which treatment is superior for frozen shoulder, and the hydrodilatation procedure leads to more discomfort in patients since it involves stretching of joint capsule. In this case series, we present 10 cases of frozen shoulder that were treated with hydrodilatation or IA steroid injection. The purpose of this study is to show the effectiveness of hydrodilatation and IA steroid injection in managing patient with frozen shoulder.

Methods: This study was a retrospective case series of patients who received IA steroid injection or hydrodilatation. Five patients underwent IA steroid injection, and another five patients underwent hydrodilatation. The American Shoulder and Elbow Score (ASES) was used to evaluate each patient before and six months after treatment.

Result: Hydrodilatation and IA steroid injection showed significant improvement in ASES score assessed at 6-month follow-up.

Conclusions: Hydrodilatation and IA steroid injection are both effective to treat frozen shoulder in long term follow up.

Introduction

Frozen shoulder, also known as adhesive capsulitis, is commonly used to describe loss of range of motion in the glenohumeral joint, initially explained by Neviaser.¹ This inflammatory condition cause the fibrosis on glenohumeral joint, followed by gradually progressive stiffness and significant restriction of range of motion (typically external rotation). The etiology of frozen shoulder is still unknown. However, some reasonable risk factors have been identified, such as diabetes mellitus, thyroid disorder, shoulder trauma, stroke, etc.² Diabetes mellitus is the most commonly

condition associated with frozen shoulder, with diabetic patients having 10%-20% lifetime risk of developing frozen shoulder.^{3,4} The epidemiologic prevalence of frozen shoulder is estimated to be slightly greater than 2% in the general population, it affects more women than men, and is more common between the ages of 40 and 60 years.³

Several treatments have been recognized and used to reduce pain and increase range of motion faster than the natural course of the disease, this includes oral analgesics, oral or intraarticular (IA) corticosteroids, physiotherapy, manipulation,

and hydrodilatation (distension).⁵ In fact, physiotherapy often unsuccessful to treat frozen shoulder, manipulation for frozen shoulder requires anesthesia and associated with higher cost, and also the long term use of oral analgesics can cause many side effects. Among these treatments, IA steroid injection and hydrodilatation have been reported to be more effective.^{6,7} However, because hydrodilatation involves stretching or rupturing the joint capsule to improve glenohumeral mobility,⁸ it is more discomfort for the patient. There are still debate over which treatment is better for frozen shoulder between hydrodilatation and IA steroids injection.

In this case series we present 10 cases of frozen shoulder who were treated with IA steroid injection or hydrodilatation. In both treatments, we used the American Shoulder and Elbow Score (ASES) to assess clinical outcome. The purpose of this study is to show the effectiveness of hydrodilatation and IA steroid injection in managing patient with frozen shoulder.

Material and Methods

Patients with frozen shoulder between 2021-2022 were included in this study. The diagnosis of frozen shoulder was obtained from the patients who came to the outpatient clinic with progressive diffuse shoulder pain and limited range of motion, especially 50% loss of external rotation compared to the contralateral side. Ultrasonography and x-ray of the shoulder were done to exclude rotator cuff tear, calcific tendinitis, and osteoarthritis of the shoulder.

Five patients were given IA steroid injection and another 5 patients underwent hydrodilatation. The American Shoulder and Elbow Score (ASES) was used to evaluate each patient before and after treatment. Clinical symptoms were evaluated at 6

months after treatment. We set 6 months for the follow-up evaluation period because this period has already exceeded and also doubled the minimum follow up requirement after the procedure, which should therefore be adequate to assess the result of the injection treatments. The clinical outcome was evaluated using the ASES score, which has been demonstrated to be reliable, valid, and responsive to clinical change, thereby supporting its use as a tool with which to assess functional limitations in patients with shoulder dysfunction.⁹

American Shoulder and Elbow Score (ASES)

The ASES is a standardized, patient-reported outcome measure that evaluates the functional status and pain levels of patients with shoulder and elbow disorder. It includes a physician-rated and patient-rated section, and only the pain visual analog scale (VAS) and 10 functional questions are used to calculate the reported score.⁹ The total score has a maximum of 100 point and is equally weighted between pain and function.

The ASES is widely used in clinical research and practice to assess the effectiveness of various treatments and interventions. Moreover, the ASES score has been demonstrated to be a valid and reliable outcome measure for assessing the effectiveness of non-operative outcomes.⁹

Treatment Procedure

Intra-articular Steroid Injection

For IA steroid injection, a posterior approach was used, and the procedure were performed with the patient in the right or left recumbent position. Povidone and alcohol sterilization were performed around the injection site, followed by sterile draping. A 12 mgHz linear array probe is used to identify the glenohumeral joint (Mindray,

Shenzhen). Following skin anesthesia with 1% lidocaine, a 22-spinal needle is inserted medial to lateral in plane with the probe until the tip reaches the target between the labrum and head of the humerus. Then, 5 to 10 cc of normal saline is injected to make sure the fluid spreads intra-articularly. If the needle struck against bone, it was retracted and redirected at a slightly different angle. After that, it was followed by injection of a mixture of 4 mL of water soluble triamcinolone (40 mg), 2 mL of Lidocaine 2%, and 14 mL of NaCl 0.9% slowly. Intra-Articular injection is also confirmed by kick back sensation of the fluid during injection.

Hydrodilatation

For hydrodilatation, the procedure is similar to an IA steroid injection. We continue with normal saline after the steroid injection to distend the capsule further, ideally before the capsule ruptures; that is when resistance begins to loosen during injection, or we stop the injection when the patient can no longer tolerate the discomfort.

Table 1. ASES score of patient pre and post Hydrodilatation

Sex	Age	ASES score pre-Hydrodilatation	ASES score 6 months post Hydrodilatation	Improvement of symptoms based on ASES score
Female	50	30	83	64 %
Male	48	32	81	60%
Female	43	40	84	52%
Male	56	34	85	60 %
Male	56	41	84	51 %

Result

Patients in both groups were assessed for an ASES score at presentation and were evaluated 6 months after the treatment. Table 1 is the ASES score of patients who

underwent IA steroid injection. Table 2 is the ASES score of patients who underwent hydrodilatation. The results were drawn for both groups, and it was found that both groups showed a significant improvement of clinical symptoms based on the ASES score. In the IA steroid injection group, there was an average improvement of 66% on the ASES score in 6 months of follow-up (Table 1), whereas the hydrodilatation group showed an average improvement of 57.4% on the ASES score (Table 2).

Discussion

Our study showed, either IA steroid injection or hydrodilatation both showed improvement in ASES score at the six month follow-up. In order to improve the clinical interpretation of ASES score, the minimal clinically important difference (MCID) was used. Ian A. Jones, Ba *et al.* have evaluated the available literature of shoulder MCID and it's shown the average reported MCID values for the ASES score were 15.5 points.¹⁰ Both groups showed improvement in ASES score over the MCID values.

Several studies supported our findings that there is no significant difference between IA steroids injection and hydrodilatation in treatment for frozen shoulder.^{7,11,12}

Table 2. ASES score of patient pre and post IA steroid injection

Sex	Age	ASES score pre-IA	ASES score 6 months post-IA	Improvement of symptoms based on ASES score
Male	56	28	80	65 %
Male	66	30	82	63%
Female	53	26	80	67.5%
Male	53	24	84	71%
Female	58	29	81	64%

Lin M-T *et al.* showed that IA was as effective as hydrodilatation in shoulder function improvement and pain reduction, yet hydrodilatation shown better external rotation improvement in medium term follow up but to a minor extent in the long term.¹² Wu WT *et al.* also showed in their study that hydrodilatation achieved similar efficacy as compared with IA steroids injection for the improvement of shoulder function.⁷ Moreover, a previous systematic review by Länderman A *et al.* revealed that capsular distension (hydrodilatation) with corticosteroid provides the best overall prospect for short-term pain relief and improvement in range of motion across all time frames for frozen shoulder when compared to IA.¹³ Additionally, it has also been shown that hydrodilatation provides further medium-term advantages over IA in external rotation and abduction, yet the period of follow up in this study tends to be shorter.

In long-term follow-up, our clinical series and the studies mentioned above show no clear advantages of hydrodilatation over IA steroid injection. Because hydrodilatation is technically more difficult

and frequently causes more pain to patients during the procedure, an IA steroid injection for frozen shoulder is preferable.

This study has some limitations. First, our series was only 10 patients without differentiating the phase of frozen shoulder. Second, we only followed up the patient with ASES score at 6 month follow up without physical examination. However, we believed that 6 months follow up is the strength of this series since most of the studies are short term follow up.^{7,11-13} Third, our IA steroids injection procedures might be biased because of the use in significant amounts of normal saline volume that might also distend the capsule. It was used to make sure the fluid was injected intra-articularly and the steroids were spread evenly throughout the capsule.

Conclusion

Hydrodilatation and IA steroids injection are both effective to treat frozen shoulder in long term follow up.

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