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A study on management of frozen shoulder by intra-articular corticosteroid injection

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Abstract
Introduction: Frozen shoulder also known as adhesive capsulitis is a condition characterized by pain and loss of motion of the shoulder joint. Several modalities of treatment have been devised for the management of this condition. The purpose of the present study was to evaluate the effectiveness of intra-articular steroid injection in the management of frozen shoulder.
Materials and Methods: This was a prospective observational study conducted on 40 patients of either sex with an average age of 56.65 years presenting to the Government Hospital, Pakherpora, J&K, India between January 2018 and November 2019, with a diagnosis of frozen shoulder. All the patients were administered intra-articular steroid injections into the shoulder joint. The patients were followed up for a period of 6 months. The results were analysed through the assessment of visual analog scale (VAS) and disability of arm shoulder and hand (DASH) score.
Results: Majority of the patients had significant relief with this method. The VAS and DASH score improved from the pre-treatment values of 8.92 and 78.62 to 2.55 and 27.56 respectively, which was found to be statistically significant ($p<0.001$).
Conclusion: The results of our study demonstrate that the intra-articular steroid injection is a safe and effective treatment modality for frozen shoulder.

Keywords: frozen shoulder, adhesive capsulitis, intra-articular steroid injection

Introduction

Frozen shoulder also known as adhesive capsulitis, is a condition characterized by a contracted, thickened joint capsule that is drawn tightly around the humeral head with a relative absence of synovial fluid and chronic inflammatory changes within the sub-synovial layer of the capsule [1]. The exact etiology of this disorder remains uncertain. Evidence suggests that the underlying pathological changes in adhesive capsulitis are synovial inflammation with subsequent reactive capsular fibrosis [2, 3]. Cytokines and metallo-proteinases have been implicated in the process, but the initial triggering event in the cascade is unknown [4]. The incidence of frozen shoulder in the general population is around 2 to 5 %. This condition has been classified into two basic types, primary with idiopathic etiology with no inciting event and secondary associated with an inciting event such as injury or associated disorders such as rotator cuff tear, hemiparesis, cardiovascular diseases and diabetes mellitus [5]. There are no universally accepted criteria for the diagnosis of frozen shoulder but usually internal rotation frequently is lost initially, followed by loss of flexion and external rotation [6]. Adhesive capsulitis is commonly described as passing through three stages: Stage 1 (pain stage) with increasing pain and stiffness lasting 2–9 months, Stage 2 (stiffness stage) with persistent stiffness lasting 4–12 months, and Stage 3 (thawing stage) with spontaneous recovery lasting 12–42 months [7]. Traditionally, frozen shoulder has been considered a self-limiting condition, lasting 12 to 18 months without long-term sequelae[8,9]. However, up to 40% of patients may experience persistent symptoms, with 7%–15% having some degree of permanent functional loss [10, 11].

Various treatment regimens have been described for the management of adhesive capsulitis, like benign neglect, supervised physical therapy, nonsteroidal anti-inflammatory medications, oral corticosteroids, intra-articular steroid injections, distention arthrography, closed manipulation, open surgical release, and arthroscopic capsular releasep [12, 13, 14, 15]. Initial treatment is non-operative, with emphasis placed on control of pain and inflammation, with most patients undergoing remission with conservative treatment, while the more invasive treatments are reserved for patients who fail to show improvement with conservative methods of treatment. Intra-articular steroid injection is a widely used treatment modality for adhesive capsulitis, especially in stage 1 and 2 of the disease. It is cost effective and easily accepted by the patients. Intra-articular corticosteroids due to their anti-inflammatory action may reduce synovitis, limit the development of capsular fibrosis and alter the natural history of the disease [16, 17].

In the present study, we evaluated the effectiveness of intra-articular corticosteroid injection in the management of frozen

shoulder through the assessment of visual analog scale (VAS) and disability of arm shoulder and hand (DASH) score.

2. Materials and methods

After approval from the institutional ethics committee and informed written consent, the study was started. This was a prospective observational study conducted on 40 patients of either sex with an average age of 56.65 years presenting to the Government Hospital, Pakherpora, J&K, India between January 2018 and November 2019, with a diagnosis of frozen shoulder. The sex distribution was 25 females and 15 males.

2.1 Inclusion criteria

1. Age greater than 30 and less than 70 years.
2. Unilateral shoulder involvement.
3. Clinical features of greater than 6 weeks duration.
4. No improvement with a trial of anti-inflammatory medications and physical therapy.
5. Frozen shoulder in diabetic patients.

2.2 Exclusion criteria

1. Age less than 30 and greater than 70 years.
2. Bilateral shoulder involvement.
3. Clinical features of less than 6 weeks duration.
4. No history of a trial of anti-inflammatory medication and physical therapy given or history of significant improvement following the trial.
5. Secondary frozen shoulder in patients other than diabetics.
6. History of previous surgical procedure in the involved shoulder.
7. Active superficial or deep infection around the shoulder joint.

Before the procedure, all the patients were thoroughly examined and proper history was taken. VAS and DASH score were measured. The procedure was explained to the patients in detail and informed consent was taken.

2.3 Procedure

The posterior approach for shoulder intra-articular injection was used. The patients were seated on a chair with their arm resting at their side with the shoulder in neutral rotation resting on their lap. The sulcus between the humeral head and acromion was identified. Under strict aseptic precautions, an 18 gauge needle was inserted 2-3 cm inferior and medial to the posterolateral corner of the acromion and directed anteriorly towards the coracoid process. The shoulder was injected with a solution containing 2ml of Methyl Prednisolone (80mg) and 2 ml of xylocaine (2%). The patients were prescribed oral antibiotics and analgesics for 5 days and advised to perform range of motion of the shoulder within the limits of pain. The patients were followed up monthly for 6 months. At the follow ups range of motion was gradually increased and graded increase in the activities of daily routine was done. At the end of 6 months, the VAS and DASH score were again measured, and the data collected was subjected to analysis.

2.4 Statistical methods

The data was analysed with SPSS version 17.0 software. The demographic variables were assessed by number and percentage. Simple arithmetic mean was used for the description of the values of VAS and DASH score. A decrease in values of both scores from the pretreatment period to the follow up period was indicative of relief from the symptoms of the disease. A p value <0.05 was taken to be statistically significant.

2.5 VAS

This score was assessed by a scale ranging from 0 to 10, with 0 representing no pain at all, while 10 representing the worst possible unbearable pain. (Fig 1.)

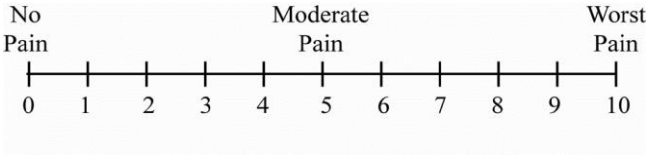

Fig 1: Visual Analogue Scale for grading of pain.

2.6 Disability of arm shoulder and hand (DASH) score

This score was calculated by a questionnaire, 30 items related to various activities performed by upper limb were asked to the patients and scored from 1 to 5, with 1 representing no difficulty in the respective activity while 5 representing inability to perform the activity. At least 27 of the 30 items must be completed for this score to be calculated. The values for all completed responses were summed and averaged, producing a score out of 5. The value was then transformed to a score out of 100 by subtracting 1 and multiplying by 25. The score was thus converted to a 0-100 scale with higher score indicative of greater disability.
DASH score = [(sum of n responses / n) - 1] x 25 where n is equal to the number of completed responses.

3. Results

This was a prospective observational study. Most of the patients in our study had a significant clinical improvement with intra-articular corticosteriod injection. The mean value of the VAS improved from pretreatment value of 8.92 to 2.55 at follow up, while the mean value of DASH score improved from a pretreatment value of 78.62 to 27.56 at follow up. Both of these changes were found to be statistically significant ($p<0.001$). Three patients did not have any improvement with the injection, two of them had improvement with repeat injections, while one patient did not improve and required manipulation under anaesthesia.

Table 1: Age distribution.

Age in years	No. of patients	Percentage (%)
30-40	3	7.5
41-50	9	22.5
51-60	14	35
61-70	14	35
Total	40	100

Table 2: Sex distribution.

Gender	No. of patients	Percentage (%)
Male	15	37.5
Female	25	62.5
Total	40	100

Table 3: Depiction of the results of the study by the change in the values of DASH and VAS Scores.

Parameter.	Mean value of the parameter before treatment	Mean value of the parameter at 6 months follow up.	P. Value
VAS	8.92	2.55	<0.001
Dash score	78.62	27.56	<0.001

4. Discussion

Frozen shoulder, also known as adhesive capsulitis is a common clinical entity affecting around 2 to 5 % of the population. This condition leads to a progressive loss of glenohumeral movements, especially external rotation, and shoulder pain [18]. It is believed that an inflammatory reaction in the rotator interval, results in painful motion and subsequent fibrosis, and stiffness that limits movements [19, 20, 21]. Certain pathological conditions [22, 23] are associated with an increased incidence of this disorder, including female gender, age greater than 49 years, diabetes mellitus [24]. (five times more), cervical disc disease, prolonged immobilization, hyperthyroidism, stroke, myocardial infarction, autoimmune diseases, and trauma [25]. Individuals between ages 40 and 70 are more commonly affected. Approximately 70% of patients are women. Twenty percent to 30% of affected individuals develop adhesive capsulitis in the opposite shoulder. The condition rarely recurs in the same shoulder. Common to almost all patients is a period of immobility, the causes of which are diverse; this probably is the most significant factor related to the development of the condition [26]. Traditionally, frozen shoulder has been considered a self-limiting condition, lasting 12 to 18 months without long-term sequelae, however some patients have long-term problems [11].

Several treatment modalities have been used for the management of adhesive capsulitis with varying degree of success [12]. Intra-articular corticosteroid injection into the shoulder joint is a commonly used treatment modality in the management of frozen shoulder. The effectiveness of the corticosteroids in adhsesive capsulitis, is mainly due to their anti-inflammatory action. Besides this modality is cheap and the patient compliance is good. The effectiveness of intra-articular corticosteroid steroid injection in the management of frozen shoulder has been demonstrated by several clinical studies over the years [27-32].

In the present study, we evaluated the effectiveness of the intra-articular Corticosteroid injection in the management of frozen shoulder, through the assessment of VAS (Figure 1) and DASH score, with a decrease in both the scores indicative of relief from the symptoms.. This was a prospective observational study conducted on 40 patients of either sex (Table 2.) with an average age of 56.65 years (Table 1.). All the patients were treated with intra-articular corticosteroid steroid injection into the shoulder joint and were followed up for a period of 6 months. The VAS and DASH score were measured before treatment and at follow up. Most of the patients in our study had a significant clinical improvement with intra-articular corticosteriod injection. The mean value of the VAS improved from pretreatment value of 8.92 to 2.55 (Table 3.) at follow up, while the mean value of DASH score improved from a pretreatment value of 78.62 to 27.56 (Table 3.) at follow up. Both of these changes were found to be statistically significant ($p<0.001$). Three patients did not have any improvement with the injection, two of them had improvement with repeat injections, while one patient did not improve and required manipulation under anaesthesia.

The results of our study are quite comparable to other studies done about this procedure [33, 34, 35]. In the study by Sun *et al* [33]. they found a significant reduction in VAS with intra-articular steroid inections which compares favourably to our study. Marx *et al* [34] in their study found significant clinical improvement in the patients of frozen shoulder treated with intra-articular corticosteroid injections which is quite affirmative of our study. In the study by Misra and Batra [35], the mean values of VAS score improved from a pretreatment value of 7.67 to 2.89 at follow up, which is very favourably comparable to our study.

5. Conclusion

Thus from the above analysis, we can infer that intra-articular corticosteroid injection is a safe and effective modality of treatment for the management of frozen shoulder.

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