

## Prospective Clinical Study on Intraarticular Corticosteroids Injection, Medical Management, and Hydraulic Capsular Distension with Supervised Physical Therapy for Frozen Shoulder Management

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### Abstract:

**Background:** Frozen shoulder, also known as adhesive capsulitis, is a painful condition characterized by shoulder pain and restricted range of motion. It is a common musculoskeletal problem, with a higher prevalence in individuals with diabetes. Various treatment approaches have been used to manage frozen shoulder, but the optimal management remains debated due to conflicting reports on treatment efficacy.

**Methods:** This prospective clinical study aimed to evaluate the effectiveness of three treatment modalities, namely Intraarticular Corticosteroid Injection, Medical Management, and Hydraulic Capsular Distension, combined with Supervised Physical Therapy, in managing frozen shoulder. The study was conducted as a hospital-based, randomized, and comparative trial with a sample size of 26 subjects in each treatment group. Patients were assessed over a 12-week study duration, and pain scores, abduction range of motion, and Shoulder Pain and Disability Scores (SPADI) were recorded at various time points.

**Results:** This study compares three treatments for shoulder pain. Intraarticular Steroids showed the best pain relief and function, followed by Hydraulic Distension and Medical Management.

**Conclusion:** The Intraarticular Steroid treatment (Group A) showed promising results in terms of pain relief and shoulder function. Hydraulic Distension (Group B) and Medical Management (Group C) also demonstrated improvements, but not as significant as Group A. Understanding these findings can aid clinicians in making informed treatment decisions for patients with shoulder pain and disability.

**Keywords:** Frozen shoulder, adhesive capsulitis, Intraarticular Corticosteroid Injection, Medical Management, Hydraulic Capsular Distension, Supervised Physical Therapy.

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### Introduction

Frozen shoulder, also known as adhesive capsulitis, is a painful condition characterized by shoulder pain lasting for more than four weeks and a significant reduction in glenohumeral joint movement of at least 50% in all directions.

The term "frozen shoulder" was first coined by Navasier to describe a contracted and thickened joint capsule, lacking sufficient synovial fluid and showing chronic inflammatory changes in the subsynovial layer of the capsule. This condition has an incidence of 3-5% in the general population, and the prevalence is even higher, reaching up to 20% in individuals with diabetes. Consequently, frozen shoulder is one of the most commonly encountered musculoskeletal problems in orthopedics.[1]

Historically, there has been a somewhat optimistic outlook regarding the recovery from frozen shoulder, with many treatment approaches

reporting a high percentage of patients achieving full range of motion and symptom relief. However, conflicting reports indicate that a significant proportion of patients may still experience measurable restrictions and persistent symptoms despite treatment.[2]

Frozen shoulder typically affects females in their 50s to 70s and can occur bilaterally in up to half of the patients. Diabetes mellitus is a common comorbid condition associated with frozen shoulder, with an incidence ranging from 10% to 36%. Pathological findings include joint capsule retraction and thickening, along with reduced joint fluid volume. The condition follows a three-phase course: freezing (pain), frozen (decreased range of motion), and thawing (resolution). While the spontaneous resolution of frozen shoulder can occur over several months to years, the optimal

management of the condition remains a subject of debate.[3]

Common treatment options include intra-articular corticosteroid injections and physiotherapy programs involving exercises and physical agents, with some incorporating hydraulic capsular distension. However, there is a lack of clear evidence regarding the efficacy of these treatments in improving pain and function and altering the natural history of frozen shoulder. The present manuscript aims to contribute to the ongoing debate on frozen shoulder management by conducting a controlled trial comparing the efficacy of a single intra-articular corticosteroid injection, manipulation under anesthesia, and hydraulic capsular distension.[4]

Intra-articular steroid injections are a widely used medical intervention for painful joint conditions, allowing direct delivery of corticosteroids with analgesic and anti-inflammatory properties to the affected site. Manipulation under anesthesia involves the manual disruption of capsular fibrosis, potentially improving shoulder movement. Hydraulic capsular distension, on the other hand, aims to provide pain relief by rupturing the contracted capsule. [5]

Considering the prevalence of frozen shoulder in developing countries and the importance of finding cost-effective and safe procedures to reduce morbidity, this study evaluates the functional outcomes of each treatment modality. The procedures will be conducted as outpatient procedures, enabling patients to be discharged after a short observation period of 3-4 hours. By shedding light on the efficacy of intra-articular steroids, Hydraulic Distension, and Medical Management this study also aims to contribute valuable insights into the management of frozen shoulder, potentially guiding clinicians toward the most effective and beneficial treatment approach.[6]

### Materials and Methods

The present study was conducted at Dr. Yashwant Singh Parmar Government Medical College (YSPGMC), Nahan, in the Department of Orthopaedics. The study was conducted with appropriate permissions from the Institutional Ethical Committee and Review Board, ensuring adherence to ethical guidelines. Informed and written consent was obtained from all participating patients.

The study was designed as a hospital-based, prospective, randomized, and comparative study. The aim was to assess the efficacy of two different treatment modalities for frozen shoulder. A sample size of 26 subjects was calculated for each of the three groups, considering an alpha error of 0.05 and

a statistical power of 80%. The detectable difference in the mean of external rotation was assumed to be 30 degrees with a standard deviation of 35 degrees, as per relevant previous studies. To account for potential attrition, dropouts, or loss of follow-up, 26 subjects were included in each group, incorporating a 10% buffer.

The study was conducted over a period from 1st April 2021 to 1st April 2022, during which the enrolled subjects were assessed and treated according to the assigned treatment modality. Data were collected and analyzed to evaluate the functional outcomes of both interventions, aiming to contribute valuable insights into the management of frozen shoulder.

Randomisation: patients were randomised in 3 groups using chit in the box method.

### Eligibility Criteria

#### Inclusion Criteria

1. Patients with history of chronic shoulder pain and decreased range of motion (active and passive ) of shoulder.
2. Age group 40-70 years.
3. Either sex.
4. Patients with pain and stiffness for atleast 4 weeks.
5. Who have been on conservative management like pain killers , physiotherapy etc.
6. Patients who give consent to participate in study.
7. Diabetic patients whose HbA1c is less than 6.5% and fasting blood sugar levels are less than 126 mg/dl.

#### Exclusion Criteria

1. Patients with intrinsic pathologies of the shoulder such as :
  - a. rotator cuff tears
  - b. biceps tendinitis
  - c. calcific tendinosis
  - d. history of fracture and dislocation
  - e. arthritis of glenohumeral or acromioclavicular joint
  - f. sympathetic dystrophy
2. Patients with extrinsic problems such as:
  - a. Neuromuscular disorders (parkinsonism)
  - b. Referred pain from associated conditions- extrusion of a cervical disc with radiculopathy
  - c. History of previous surgery of affected shoulder.
3. Patients who refuse to participate in study.

### Result

In this study, we investigated the effects of three different treatment modalities for managing shoulder pain and disability. We compared the outcomes of Group A (Intraarticular Steroid),

Group B (Hydraulic Distension), and Group C (Medical Management) over a 12-week period. Table 1 displays the pain scores at various time points for each group. All groups showed a significant reduction in pain scores over time, with Group A having the lowest scores at the 12-week mark.

Table 2 presents the abduction measurements for each group. Group B consistently showed the highest improvement in abduction, followed closely by Group C. Table 3 illustrates the shoulder pain and disability index (SPADI). Group A had the lowest SPADI index throughout the study, indicating better shoulder function and less disability compared to the other groups.

**Table 1: Pain Score**

Time Point	Group A (Intraarticular Steroid)	Group B (Hydraulic Distension)	Group C (Medical Management)
At first visit	3.60±0.875	4.10±0.920	4.40±0.870
1 Week	2.48±0.895	3.20±0.785	3.80±0.810
3 Week	1.94±0.705	2.40±0.640	2.60±0.710
7 Week	1.715±0.530	1.90±0.510	2.00±0.580
12 Week	1.26±0.460	1.40±0.460	1.50±0.460

**Table 2: Abduction**

Time Point	Group A (Intraarticular Steroid)	Group B (Hydraulic Distension)	Group C (Medical Management)
At first visit	79.21±11.50	64.50±15.00	72.30±13.20
1 Week	97.32±9.88	80.10±17.50	85.40±12.50
3 Week	116.51±8.50	92.50±19.80	100.10±10.80
7 Week	135.03±4.80	105.60±21.00	110.20±9.20
12 Week	145.72±6.90	115.20±23.50	118.50±8.60

**Table 3: Shoulder Pain And Disability Index ( SPADI)**

Time Point	Group A (Intraarticular Steroid)	Group B (Hydraulic Distension)	Group C (Medical Management)
Presentation	85.15±6.74	88.27±6.70	90.05±6.85
1 Week	72.18±6.05	75.32±5.95	78.21±6.30
3 Week	39.88±3.72	40.15±3.48	41.80±3.60
7 Week	26.72±2.92	25.49±2.80	26.90±2.95
12 Week	5.99±4.03	6.81±4.12	7.35±4.20

## Discussion

Frozen shoulder, or adhesive capsulitis, is a painful condition characterized by shoulder pain and restricted range of motion. It is a common musculoskeletal problem, with a higher prevalence in individuals with diabetes [7]. The optimal management of frozen shoulder remains debated due to conflicting reports on treatment efficacy [8].

This prospective clinical study aimed to evaluate the effectiveness of three treatment modalities: Intraarticular Corticosteroid Injection, Medical Management, and Hydraulic Capsular Distension, combined with Supervised Physical Therapy, in managing frozen shoulder. The study compared pain scores, abduction range of motion, and Shoulder Pain and Disability Scores (SPADI) at various time points for each treatment group [9].

Results revealed that Intraarticular Steroids (Group A) showed the best pain relief and function improvement over the 12-week study period. Hydraulic Distension (Group B) and Medical Management (Group C) also demonstrated

improvements but were not as significant as Group A [10,11].

The findings suggest that Intraarticular Steroids are a promising treatment for frozen shoulder, while Hydraulic Distension and Medical Management also offer benefits. Clinicians can use this information to make informed treatment decisions for patients with shoulder pain and disability, aiming for improved outcomes and patient satisfaction [12].

## Conclusion

In conclusion, this study provides valuable insights into the management of frozen shoulder and contributes to the ongoing debate on treatment efficacy. The findings support the use of Intraarticular Steroids as a primary treatment modality, with Hydraulic Distension and Medical Management serving as potential alternatives. Further research with larger sample sizes and longer follow-up periods would enhance our understanding of the long-term effects of these treatments

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