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ORIGINAL ARTICLE

The Efficacy of Intra-Articular Methylprednisolone Injections in Treating Idiopathic Frozen Shoulder: Descriptive Case Series Study

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ABSTRACTS

Introduction: Frozen shoulder is a clinical condition marked by painful limitations in both active and passive shoulder movements. There are several therapeutic options available aimed at restoring mobility and alleviating pain for individuals suffering from frozen shoulder. A significant indicator of this condition is the restriction of shoulder movement in all directions, affecting both passive and active ranges of motion.

Objective: To assess the effectiveness of intra-articular methylprednisolone injections in treating idiopathic frozen shoulder.

Methodology: This descriptive case series study was carried out in the Department of Orthopaedics at Bolan Medical College in Quetta. The study included patients aged between 30 and 60 years, of both genders, who were diagnosed with unilateral idiopathic (primary) frozen shoulder, specifically in phases I and II, and had experienced symptoms for less than six months. Participants were required to have a University of California Los Angeles (UCLA) shoulder rating scale score of 27 or lower. A 4cc injection was administered, consisting of 1cc of methylprednisolone (equivalent to 40mg) and 3cc of 2% lignocaine. The functional outcome was deemed acceptable according to the operational definition at the conclusion of the 12th week following the injection.

Results: The average age of the patients was 43.10 years, with a standard deviation of 9.66 years. A significant portion of the cohort, 59 patients (67.80%), was male, while 28 patients (32.20%) were female. The mean duration of symptoms reported was 3.58 months, with a standard deviation of 1.09 months. In most cases, 63 patients (72.40%) experienced symptoms for four months or less. A satisfactory functional outcome was noted in 52 patients, accounting for 59.80% of the total.

Conclusion: A satisfactory functional result from intra articular injection of methylprednisolone was noted in 52 patients, accounting for 59.80%, who were diagnosed with idiopathic frozen shoulder.

Keywords: idiopathic frozen shoulder, acceptable functional outcome, intra articular injection, methylprednisolone

INTRODUCTION

Frozen shoulder is a medical condition marked by painful limitations in both active and passive range of motion.[1]

Frozen shoulder has typically been classified into two categories: primary (idiopathic) and secondary. The secondary type arises from pre-existing conditions, which may include diabetes mellitus, rotator cuff tendinopathy or tears, subacromial bursitis, biceps tendinopathy, recent shoulder surgery or trauma, as well as inflammatory diseases.[2,3,4]

The incidence of frozen shoulder is approximately 3 percent in the general population.[5,6] Frozen shoulder is typically characterized as having three overlapping phases.[7](1) In which there is progressive stiffening and loss of motion in the shoulder with increasing pain on movement, usually referred to as 'painful' phase. (2) In which there is a gradual decrease in pain but stiffness remains and there is considerable restriction in the range of movement, usually referred to as the stiffening or 'freezing' phase. (3) In which there is an improvement in range of movement, usually referred to as the resolution phase.

This includes rest, non-steroidalanti-inflammatory drugs, active and passive mobilization, physiotherapy, oral and intra-articular corticosteroids, hydro-dilatation, manipulation under anesthesia, arthroscopic capsular release and suprascapular nerve block.[8,9,10]

Diagnosis, in both primary and secondary settings, is based on clinical examination and medical history. A key alerting feature is restriction of shoulder movement in all directions— passive and active range of movement.[11]

As per University of California Los Angeles (UCLA) shoulder rating scale at the end of 12th week, 15 (35. 7%) poor, 17 (40.5%). good and 10 (23.8%) patients with, frozen shoulder had excellent recovery (UCLA score of >27 was considered as good to excellent functional recovery).[12]

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The rationale of this study was that data on this topic is scarce and reported outcome assessed on different scales, therefore the present study is designed to assess functional outcome of frozen shoulder on validated scale and if the study shows acceptable outcome then the same modality was subsequently used in similar cases.

MATERIALS AND METHODS

Study was started after seeking approval from 20st June 2021 to 21st May 2023 at the Department of Orthopaedics at Bolan Medical College in Quetta. Permission for data collections was duly sought from the Institutional Review Board of Bolan Medical College. Confidentiality of data of patients was maintained strictly. Patients were selected from OPD of ward BMC, once they fulfilled the inclusion criteria. All the data of the patient was collected and recorded in the Proforma after getting an informed and written consent. Patients will then be shifted to day care procedure room. Informed consent was obtained and patients were made as comfortable as possible. Sterile technique was utilized and gloves worn. A 4cc preparation (1cc methylprednisolone equal to 40mg and 3cc lignocaine 2%) was made. The affected shoulder is palpated until the distal, lateral and posterior edges of the acromion are identified and marked (e.g. thumbnail or marker). The skin should be cleaned with alcohol swabs or chlorhexidine and allowed to dry completely. Topical anesthesia such as lignoacaine (lidocaine) was applied to anaesthetize the shoulder 3-5 min was allowed to ensure that the area is sufficiently anaesthetized before injecting the preparation. A 22-gauge IV cannula, was inserted inferior to the posterolateral corner of the acromion, aiming the needle medially and slightly anteriorly under the acromion with the tip directed to the under surface of the acromion. The needle was then being advanced to the joint cavity. Prior to injection, the plunger withdraw, which may return synovial fluid and confirm the correct location. This was also ensured that a blood vessel has not been entered. The preparation was injected. An adhesive strip was used to cover the injection site after the

procedure. The procedure was performed by surgeon having more than 2 years of orthopaedic experience. After the procedure, patients was advised to limit activity for 24 hours and counselled to use ice and analgesia. Patients were taught to start active home exercises after 24 hours. OPD follow ups were carried out at 3rd, 6th, 9th and 12th week of injection. Functional outcome was labelled as acceptable as per operational definition at the end of 12th week of injection.

Data Analysis: The data was entered and analyzed into statistical package for social sciences (SPSS version 11). Frequency and percentage was computed for categorical variable such as gender, and functional outcome. Mean and standard deviation was computed for age, duration of the symptoms and university of California Los Angeles scores. Effect modifier was controlled by stratification of age, gender and duration of symptoms through chi square test. P value ≤ 0.05 was taken as significant.

RESULTS

Mean age of the patients was 34.09 ±7.33 years. (Table 1), There were 114 (65.50%) patients with <45 years of age. (Figure 1), Majority 118 (67.80%) patients were males and 56 (32.20%) were females. (Figure 2), Mean duration of symptoms was 2.34 ±1.09months. (Table 2)

In majority of the patients 126 (72.40%), duration of symptoms was ≤4 months. (Figure 3)

Mean UCLA score was 15.90 ±2.89. (Table 3)

Acceptable functional outcome was observed in 104 (59.80%) patients. (Figure 4)

Cross-tabulation was done to see the effect of age, gender and duration of symptoms on the outcome. Chi-square test was applied. Results are shown in table 4-6.

Table 1: Age of the patients

Mean ±SD	Minimum	Maximum
34.09 ±7.33	31	60

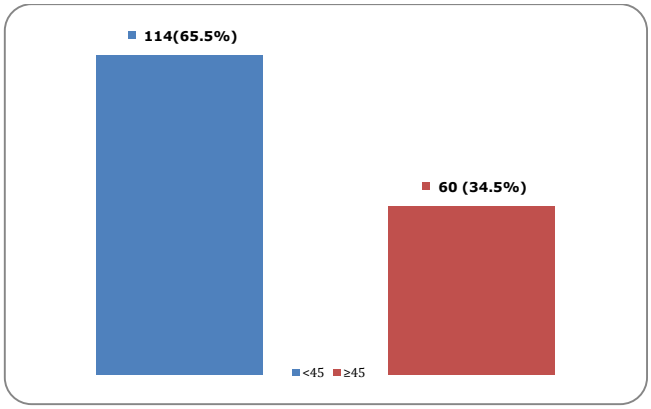

Figure 1: Age groups

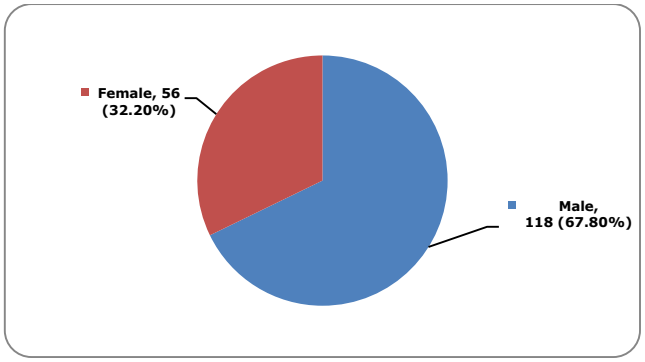

Figure 2: Gender Distribution

Table 2: Duration of symptoms (in months)

Mean ±SD	Minimum	Maximum
2.34 ±1.09	2	5

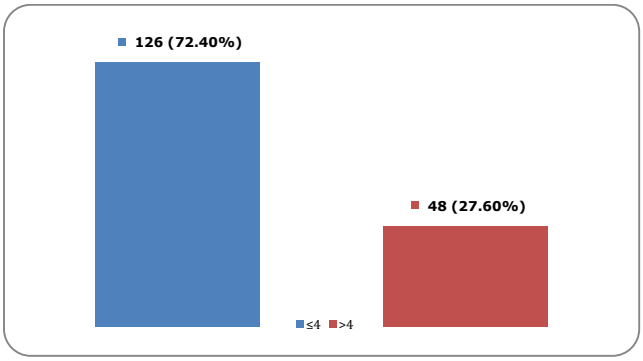

Figure 3: Duration of Symptoms (in months)

Table 3: University of California Los Angeles Scores

Mean ±SD	Minimum	Maximum
15.90 ±2.89	23	33

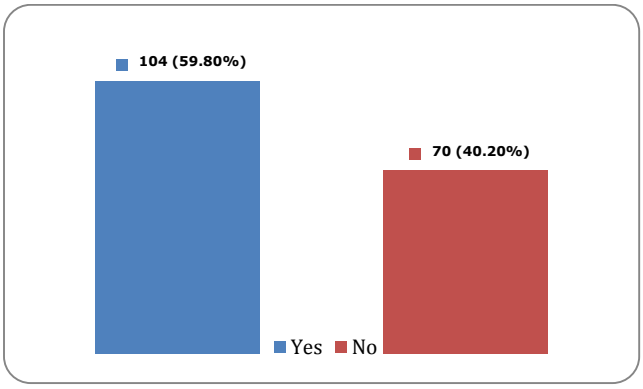

Figure 4: Acceptable Functional Outcome

Table 4: Comparison of age with Functional Outcome

Age (in years)	Functional Outcome		Total	p-value*
	Yes	No		
<45	72 (69.2)	26 (60)	114(65.5)	0.242
≥45	32 (30.8)	28 (40)	60 (34.5)	
Total	104 (100)	70 (100)	174 (100)	

N(%),*chi-square test applied taking p-value ≤0.05 significant

Table 5: Comparison of gender with Functional Outcome n=87

Gender	Functional Outcome		Total	p-value*
	Yes	No		
Male	70 (67.3)	28 (68.6)	98 (67.8)	0.701
Female	34 (32.7)	26 (31.4)	60(32.2)	
Total	104 (100)	54(100)	158(100)	

n(%),*chi-square test applied taking p-value ≤0.05 significant

Table 6: Comparison of duration of symptoms with Functional Outcome

Duration of symptoms (in months)	Functional Outcome		Total	p-value*
	Yes	No		
≤4	80 (76.9)	46 (65.7)	126 (72.4)	0.130
>4	24 (23.1)	24 (34.3)	48 (27.6)	
Total	104 (100)	70 (100)	174 (100)	

n(%),*chi-square test applied taking p-value ≤0.05 significant

DISCUSSION

Numerous approaches exist for the treatment of frozen shoulder, each reporting varying degrees of success. Symptoms associated with frozen shoulder tend to improve significantly when deep

heating is used in conjunction with stretching exercises. In contrast, superficial heating alone has proven to be less effective.[16]

Traditionally stretching exercises have been used to stretch the shoulder capsule. Continuous passive motion has shown more promising results as compared to this traditional practice.[17]

The combination of oral steroids, non-steroidal anti-inflammatory drugs, and physiotherapy offers effective pain relief, typically lasting no longer than six weeks.[11] In this study, a satisfactory functional outcome was noted in 52 patients, representing 59.80%. According to the University of California Los Angeles (UCLA) shoulder rating scale at the conclusion of the 12th week, 15 patients (35.7%) were classified as poor, 17 patients (40.5%) as good, and 10 patients (23.8%) with frozen shoulder achieved excellent recovery, with a UCLA score exceeding 27 indicating good to excellent functional recovery.[12]

Dudkiewicz I et al. (2004) conducted a study involving 54 patients, with an average follow-up period of 9.2 years, and concluded that conservative primary treatment for frozen shoulder, specifically physiotherapy and intra-articular steroid injections, proved to be an effective long-term treatment approach.[19,20] In the research by Dierks and Stevens, seventy-seven patients with idiopathic frozen shoulder were evaluated to compare the outcomes of exercising within pain limits versus undergoing intensive physical therapy. The findings indicated that patients who engaged in exercise within their pain thresholds experienced better results than those who received intensive physical therapy.[21]

Farrell CM et al, reported that, in patients with persistent severe stiffness, manipulation of shoulder under general anaesthesia improves range of movement at shoulder joint for a mean period of 15 years after treatment.[22] Some authors have claimed that this does not add to the benefit of exercise program.[21]

It included 27 patients of frozen shoulder (Adhesive Capsulitis) using guidelines issued by the Dutch College of General Practitioners.[22,23]

Frozen shoulder predominantly affects women in their 50s, often impacting the non-dominant arm, and can present bilaterally in up to 34% of cases.[24]

The incidence is even greater among individuals with insulin-dependent diabetes, reaching 36%, and there is a higher likelihood of bilateral shoulder involvement.[25]

A randomized, placebo-controlled trial assessed the efficacy of physiotherapy alone versus a single intra-articular steroid injection administered under X-ray guidance. The findings indicated that while supervised physiotherapy alone offers limited benefits, combining it with a steroid injection significantly alleviates both pain and disability.[26,27]

Research by Van der Wind demonstrated that steroid injections administered by a general practitioner were more effective than physiotherapy alone after six weeks.[28]

A meta-analysis examining the efficacy of intra-articular steroids revealed that treatment success is influenced by the duration of symptoms, indicating that patients who receive injections earlier in their condition tend to experience faster recovery.[29]

In a similar vein, another study demonstrated that administering corticosteroid injections during the initial stages of adhesive capsulitis enables patients to regain mobility before the onset of severe fibrosis.[30]

Rizk conducted a study comparing four different treatment approaches: intra-articular methylprednisolone combined with lidocaine, intra-articular lidocaine alone, intrabursal methylprednisolone with lidocaine, and intrabursal lidocaine. The findings indicated no significant difference in pain scores or shoulder mobility at 24 weeks between the intra-articular methylprednisolone plus lidocaine and lidocaine alone.[31]

There is ongoing discussion regarding the effectiveness of single versus multiple injections. Evidence suggests that up to three injections can be beneficial, while the advantages of four to six injections remain limited.[32]

De Jong et al. noted that the effectiveness of steroid injections is dependent on the dosage administered. In a specific case,[33] six patients (22.2%) required a second injection, as frozen shoulder in diabetic individuals tends to be more severe and resistant to treatment.[34]A study conducted in South Korea concluded that enhanced targeting of the intra-articular space through ultrasound guidance can yield improved outcomes.[35]Compared to traditional palpation-guided techniques, ultrasound guidance resulted in a 43.0% reduction in procedural pain ($p < 0.001$), a 58.5% decrease in absolute pain scores at the two-week mark, and a 75% reduction in VAS pain scores.[36]

Most patients with primary frozen shoulder have no history of shoulder trauma. They usually give a history of insidious onset of pain, followed by a loss of motion. Night and rest pain are common in the early stages. Patients who suffer from secondary frozen shoulder often give a history of known diabetes mellitus.[37]

The prevalence of frozen shoulder among diabetic patients is reported to range from 10% to 36%. Additionally, several other conditions have been linked to frozen shoulder, which may assist in the diagnostic process. These include hyperthyroidism, hypothyroidism, hypoadrenalism, Parkinson's disease, cardiovascular disease, and a prior history of stroke.[38]

A history of recent surgical procedures, including cardiac surgery, neurosurgery, and radical neck dissection, has been linked to the onset of secondary frozen shoulder. In the initial stages of this condition, the primary symptom is pain that occurs at the limits of shoulder movement. Patients in stages 1 and 2 typically report tenderness upon palpation of both the anterior and posterior shoulder capsules, along with pain that radiates to the deltoid insertion. As the condition progresses, mild disuse atrophy may be observed in the deltoid and supraspinatus muscles. Additionally, there may be widespread tenderness upon palpation of the glenohumeral joint, which can also extend to the trapezius and interscapular regions.[39]

The spread of this tenderness into the neck and upper back is attributed to the protective splinting of the affected shoulder. A complete loss of external rotation is recognized as a characteristic sign of frozen shoulder.[40]

It is crucial to determine whether this loss of external rotation is present in both active and passive movements. If passive external rotation is intact while active external rotation is absent, the possibility of a rotator cuff tear should be investigated. In cases of severely affected frozen shoulder, most movement is observed at the scapulothoracic joint, with extension and horizontal adduction being the least impacted by the disease process.[41]

The literature indicates that intra-articular injections provide superior pain relief compared to physiotherapy, analgesics, or placebo treatments. A review from the Cochrane database also suggests that while these injections may offer short-term benefits, the effects are often modest and may not be sustained over time. However, their efficacy is enhanced when combined with other treatment modalities, as demonstrated by the research conducted by Carrette et al.[42,43,44]

Research demonstrated that the combination of intra-articular steroids and physiotherapy significantly enhanced shoulder range of motion compared to the use of either treatment alone. More recent findings indicate that a combination of triamcinolone steroids and a distension of 21 ml per injection yielded comparable results to manipulation under anaesthesia after two years. This implies that the outpatient procedure they proposed can achieve similar outcomes while minimizing the risks associated with anaesthesia-related manipulation.

CONCLUSION

A satisfactory functional result from intra-articular injection of methylprednisolone was noted in 104 patients, accounting for 59.80%, who were diagnosed with idiopathic frozen shoulder.

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