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Compare the Effect of Intra-Articular Steroid Injection vs Suprascapular Nerve Block in Managing Frozen Shoulder

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ABSTRACT

Objectives: To assess the effectiveness of intra-articular steroid injection vs ultrasound guided suprascapular nerve block in managing frozen shoulder, with a focus on alleviating shoulder pain, disability, and range of motion.

Methodology: This comparative randomized clinical study was done at orthopedic department of Rawal Institute of Health Sciences, Islamabad between January and June 2024. Total 72 patients consecutively with frozen shoulder, age range was 18 years and above, of both genders, experiencing diffuse shoulder pain for ≥ 4 weeks, and with clinically confirmed frozen shoulder, were included. Patients were randomly and equally assigned to two groups (each, n = 36): Group-A received intra-articular steroid injections (IASI), while Group-B underwent suprascapular nerve block (SSNB). Data were gathered based on range of motion (ROM), and Shoulder Pain and Disability Index (SPADI) score.

Results: Patients average age was 56.6±5.8 years, and there were 38 (52.8%) males and 34 (47.2%) females. The means of ROM and SPADI score were comparable between the two group at baseline, 4 weeks and 8 weeks ($p < 0.05$). Similarly, mean disability index in Group B was significant low as compare to Group A ($p < 0.05$). External rotation mean at baseline was same between the groups. 1st, 4th, and 8th weeks post intervention, external rotation mean was significant high in Group B compared to Group A ($p < 0.05$). Similarly, abduction mean was significant high in Group B at 4th week and 8th week post-intervention ($p < 0.05$).

Conclusion: It is concluded that ultrasound guided suprascapular nerve block is more effective than intra-articular steroid injections in managing frozen shoulder.

Keywords: Frozen shoulder; Injections, Intra-Articular; Nerve block; Range of motion.

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Introduction

Frozen shoulder is a frequent complication presenting in the orthopedics OPDs. The prevalence of shoulder complications such as frozen shoulder or adhesive capsulitis, varies from 7% to 67% within general population.[1] This musculoskeletal problem varies by geographical region and is particularly prevalent among populations with sedentary and inactive lifestyles.[2] Frozen shoulder, or adhesive capsulitis, is the primary etiology of severe shoulder complications and pain. It can lead to a loss of function and ultimately result in a diminished quality of life.[3] The most frequent causes of such pain include degenerative diseases which affecting acromioclavicular and glenohumeral joints. This includes conditions affecting the soft tissues, as well as

inflammatory diseases including crystal arthropathies, seronegative spondyloarthropathies, and rheumatoid arthritis (RA).[4]

There are various therapeutic techniques but not a single one is suggested as primary option.[5] Effective treatment approaches including the use of NSAIDs, simple analgesics, intra-articular steroid injections, hydro dilatation, manipulation under anesthesia (MUA) and surgery.[6] In frozen shoulder patients, intra-articular steroid injections and ultrasound guided suprascapular nerve blocks have proven to be highly effective.[5,6] There are limited reports comparing these treatment approaches.[7]

Frozen shoulder and associated pain not only impact an individual's personal life and everyday routine but also have broader implications, such as economic losses at the national level due to decreased quality of life.[8] Thus, search for different strategies and modalities for managing patients who experiencing shoulder pain and reduced range of motion (ROM) is a continuous practice. Evidence on managing shoulder pain is scarce at both local and national levels.

The rationale of this study was identifying and recommending the ideal treatment modality for frozen shoulder patients in our local settings with the view of available healthcare facilities and financial position of the general public in Pakistan. The aim is to generate evidence base which can prove that both drugs are different in efficacy. Frozen shoulder treatment involves a multi-faceted approach, ranging from physical exercise and lifestyle changes to medications and surgical interventions. Since frozen shoulder directly targets quality of life, a person's ability of work and earning gets affected. The study objective was to assess the effectiveness of intra-articular steroid injection vs ultrasound guided suprascapular nerve block in managing frozen shoulder, with a focus on alleviating shoulder pain, disability, and range of motion.

Methodology

This comparative randomized clinical study was done at orthopedic department of Rawal Institute of Health Sciences (RIHS), Islamabad between January and June 2024. After getting the approval of Institutional Review Board vide letter No. RIHS/DME/05/2023, Dated: 11/12/2023 and volunteer consent for participation in the procedure. Total 72 patients consecutively with frozen shoulder (WHO calculator of sample size was used to calculate the sample and the following parameters were used; the mean of pain scale in suprascapular nerve block versus intraarticular steroid injections groups was 49.0±15.0 and 59.0±15.0, respectively, power of test 80%, and level of significant was 5%),[7] adults age 18 years and above, of both genders, experiencing diffuse shoulder pain for ≥ 4 weeks, frozen shoulder clinically diagnosed on the basis of symptomology and examination findings, patients who agreed to discontinue any analgesic one week before the procedure were included. Patients were excluded if they had localized bicipital tendinitis shoulder pain, rotator cuff injury, morbid obesity, pain from acute trauma, post-surgical conditions, glenohumeral fracture, bony deformities, active infections, bleeding disorders, any allergy, local anesthetics, or sensitivity to steroids.

Patients were allocated into the two treatment groups using lottery generated randomization method. The patients were divided equally into Group A (n=36), which received intra-articular steroid injection (IASI), and Group B (n=36), which given an ultrasound guided suprascapular nerve block (SSNB).

The following procedure was done for the data collection; in IASI Group A, the researcher administered the steroid injection while being supervised by a skilled orthopedic surgeon. A mixture of 2 ml methylprednisolone (40 mg/ml) and 2 ml lignocaine (1%) was injected into affected joint by posteriorly, utilizing portal of arthroscope, with a 24G needle. Once the needle entered the joint, negative aspiration was performed, and the plunger was slowly pushed with steady pressure. In SSNB Group B, the researcher, in partnership with a radiologist experienced in interventional radiology, performed the ultrasound-guided nerve block. With strict aseptic measures, a real time ultrasound was done using a 6–13 MHz linear array transducer. A 23G spinal needle was aligned with longitudinal axis of ultrasound beam to precisely locate the needle tip at notch. After positioning the needle, a SSNB was administered with 4 ml of 0.5% bupivacaine. The outcome of the intervention was judged as an immediate improvement in active ROM in affected shoulder because of immediate pain relief (due to capsular analgesia). Soon after both the interventions i.e., IASI and ultrasound guided SSNB, all study patients underwent exercise sessions. Their assessment was based on performing ROM exercises within shoulder's pain-free range.

The main outcome measures were the Shoulder Pain and Disability Index (SPADI) and the passive ROM of the affected joint, assessed at 1st week, 4th week, and 8th

week following the intervention. The study information was collected on a structured proforma. The researcher personally carried out all study procedures and data collection to reduce any selection of study biases and also to maintain data quality and continuity.

Data entry and analysis were performed using SPSS v 25. Quantitative data including age, duration of symptom, ROM, and SPADI score were assessed using mean and standard deviation. Qualitative data including sex, X-rays finding, and clinical presentation were analyzed in terms of frequency and percentage. An independent t test was employed to compare the mean of pain, external rotation, abduction, disability score, and total score between the groups. The likelihood of a p value ≤ 0.05 was rendered significant.

Results

There were 72 patients who were selected in this study, 36 were allocated in each group. The data was found hypothetically normative with p-values more than 0.05. So, the parametric test (Kolmogorov Smirnov) was used to measure the difference. A non-significant p-value was indicative of homogeneity of sample at baseline. The demographic characteristics and their presentations of all both groups patients were studied and analyzed (Table I).

Table 1 illustrates that most patients in the SSNB group exhibited pain on right side, whereas the majority in the IASI group had pain on left side. Both groups had a nearly equal number of diabetic patients.

Table I: Patients characteristics at baseline in the two groups. (n=72)

Characteristics		IASI group	SSNB group	p value
Ages (yr)	Mean±SD	57.4±5.2	55.7±6.5	.754
Gender	Male	20 (55.6%)	18 (50%)	.897
	Female	16 (44.4%)	18 (50%)	
Side of pain	Right	10 (27.8%)	15 (41.7%)	.373
	Left	26 (72.2%)	21(58.3%)	
Diabetes mellitus	Yes	15 (41.7%)	14 (38.9%)	.816
	No	21 (58.3%)	22 (61.1%)	
Shoulder appearance	Swelling	0	0	.325
	Muscle wasting	11 (30.5%)	7 (19.4%)	
Duration of symptoms in months	Mean±SD	7.8±4.1	8.9±4.2	.272

Pain score based on SPADI was evaluated between the groups at baseline and across multiple follow-up periods (Table II). SPADI score was used to measure and analyze the disability index (Table III). Furthermore, ROM in terms of external rotation and abduction was compared between two groups (Table IV).

Table II: Compare the SPADI pain score between groups. (n=72)

SPADI pain score	IASI group	SSNB group	p-value
	Mean±SD	Mean±SD	
Baseline pain score	70.4±10.3	72.3±8.0	.468
Pain at 1st week	48.9±6.4	4.4±6.4	.073
Pain at 4th week	35.9±7.3	27.2±7.8	.001
Pain at 8th week	29.9±6.6	12.4±5.5	.001

Table III: Compare the disability (SPADI) between groups. (n=72)

SPADI disability index	IASI group	SSNB group	p-value
	Mean±SD	Mean±SD	
Disability at baseline	67.8±4.71	71.9±2.38	.001
Disability at 1 week	63.9±5.14	51.5±5.10	.001
Disability at 4 weeks	51.1±5.92	42.8±5.91	.001
Disability at 8 weeks	59.8±10.92	41.1±12.2	.001

Table IV: Compare the ROM of abduction and external rotation between groups. (n=72)

ROM of external rotation	IASI group	SSNB group	p-value
	Mean±SD	Mean±SD	
At baseline	30.4±4.1	29.7±4.8	.861
At 1st week	37.6±5.4	44.6±4.7	.001
At 4th weeks	41.5±5.9	50.7±4.0	.001
At 8th weeks	45.3±8.9	54.2±4.3	.001
ROM of abduction			
At baseline	77.7±9.8	72.1±3.8	.031
At 1st week	88.0±12.1	101.2±5.0	.001
At 4th week	91.2±16.3	109.2±6.2	.001
At 8th week	101.2±10.7	116.3±4.8	.001

Discussion

This study was to assess the effectiveness of intra-articular steroid injection vs ultrasound guided suprascapular nerve block in managing frozen shoulder. The outcome was determined on the basis of SPADI score and ROM. In this study, ages of patients mean was 57.4±5.2 years in IASI group and 55.7±6.5 years in SSNB group whereas majority of the patients were lying between 50 and 60 years of age. There was slight male dominant in IASI group whereas in SSNB group female gender was dominant in this study. Verma et al in a study comparing SSNB and IASI also reported a similar trend of patient's age of presentation and gender distribution where these baseline characteristics were same in both groups.[9] All this previous literature base is comparable with current study evidence on age and gender distribution.

In the present study in both groups, most of the patients had left sided frozen shoulder. Verma et al also witnessed majority of patients with left laterality in their study.[9] Side of the shoulder has been found variable in the scientific evidence on frozen shoulder so far.

In the current study a bit more than one-third patients had diabetes mellitus in both groups. Verma et al study also witnessed a little fewer than half of their patients had diabetes mellitus.[9] It has been reported that frozen shoulder in diabetes mellitus is more severe and difficult to treat as the response to treatment is slow or very low.[10]

In the present study, the main objective, mean ROM and SPADI score were evaluated and compared between IASI and SSNB groups. It was observed that most of baseline ROM and SPADI parameters were similar between the groups. However, average pain scores at 1 week, 4 weeks, and 8 weeks post intervention were significantly lower in SSNB group compared to IASI group. Likewise, SPADI score was significant low in SSNB group compared to IASI group in this study. There is substantial evidence supporting these findings. For instance, Shankar et al study demonstrated that SSNB was more effective than IASI in relieving pain and improving movements.[11] Iqbal et al study reported significant effectiveness of SSNB in alleviating pain in frozen shoulder after intervention.[12] In a local study, Sheikh et al observed significant pain control and notable in ROM symptoms improvement in SSNB treated patients compared to those receiving IASI.[13] The investigators concluded that SSNB leads to quicker and complete pain resolution and better ROM compared to IASI.[14,15] There is evidence suggesting that SSNB and IASI are equally effective in managing frozen shoulder.[16] Verma et al study reported that while both SSNB and IASI showed significant effects within their respective groups for treating frozen shoulder, and had no any difference between the groups.[9]

This study supports previous findings that SSNB is superior to IASI in managing frozen shoulder. A wealth of scientific evidence highlights the superior effectiveness of ultrasound guided SSNB in enhancing ROM and SPADI score in frozen shoulder patients. It is recommended that, following further replication of these findings in other regions, SSNB be incorporated into routine practice in orthopedic clinics based on the scientific evidence.

There were few limitations of this study. Frozen shoulder cases were lower than anticipated, necessitating a reassessment of the data collection period. Some patients were challenging to track, and their condition was confirmed only through telephone calls.

Conclusion

The study concluded that an ultrasound guided suprascapular nerve block is more effective than an intra-articular steroid injection for managing frozen shoulder. There was no safety issues noted as image guided intervention is much better and specifically targets the affected spot.

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