ORIGINAL ARTICLE

Comparison of Suprascapular Nerve Block & Intra-articular Injection in the treatment of Frozen Shoulder

Sohail Iqbal Sheikh, Awais Ahmed, Shahid Javaid, Abdul Basit , Imran Sohail Sheikh
Saba Sohail Sheikh, Zara S. Sheikh

ABSTRACT

Objective: The objective of this study was to compare the effect of supra scapular nerve block and intra articular injection to relieve pain and reduce disability in the patients of frozen shoulder.

Study Design: It was a quasi experimental study.

Place and Duration of Study: The study was conducted at the department of Orthopedics, Pakistan Railway Hospital, Rawalpindi, from August 2011 to September 2012.

Materials and Methods: Patients diagnosed as the cases of frozen shoulder in outpatient department of Orthopedics irrespective of their gender were included in the study. Forty patients and 50 shoulders were divided into two groups by randomization, one group received single suprascapular nerve block and second group received single intra-articular steroid injection. Both groups were advised for physiotherapy after injection. Patients' pain levels and ranges of movement were assessed over a period of twelve weeks.

Results: The study included 40 patients and 50 shoulders to a single suprascapular nerve block and intra articular steroid injection. The mean age of the patients was 49.4 $\pm$ 9.97 and the range was 40-60 years. There were 16 females and 24 male patients. Post injection assessment of patients was done at two, six, eight and twelve weeks. There was a significant decrease in pain and marked improvement in range of movement with supra scapular nerve block than with intra articular injection. Patients' pain levels and ranges of movement were assessed over a twelve week period.

Conclusion: Suprascapular nerve block produced a faster and more complete resolution of pain and restoration of range of movement than intra articular injection.

Key Words: *Frozen shoulder, Suprascapular nerve block, Intra-articular injection.*

Introduction

Shoulder pain has a prevalence of 15%30% in the adult population. It is a common complaint especially amongst the elderly and may lead to functional disability and decrease in quality of life.[1] Both suprascapular nerve block (SSNB) and intra-articular injection are effective methods for the treatment of frozen shoulder.

Shoulder pain is a common cause of morbidity in the community and most common causes of that pain include degenerative disease affecting the glenohumeral and acromioclavicular joints and supporting soft tissue structures in addition to inflammatory diseases such as rheumatoid arthritis (RA), seronegative spondyloarthropathies and crystal arthropathies.[2]

Frozen shoulder or adhesive capsulitis, is a common problem in general practice presenting as pain that may be severe, accompanied by a progressive loss of movements resulting in a loss of function.[3] While many treatments have been employed, few have been proven in randomized controlled trials such as simple analgesia, NSAIDs, intra-articular steroid injection and surgery, all have their limitations.[4]

Physiotherapy is often the first line of management for shoulder pain, it can help in early stages but in established cases, physiotherapy seems to be of little benefit and its efficacy has not been established.[5]

The suprascapular nerve supplies sensory fibers to about 70% of the shoulder joint, including the superior and postero-superior

Correspondence:
Dr. Sohail Iqbal Sheikh
HOD Orthopaedics
IIMC-T, Pakistan Railway Hospital
Rawalpindi

regions of the shoulder joint and capsule, and the acromioclavicular joint. In addition it supplies motor branches to the supraspinatus and infraspinatus muscles.[6]

SSNB performed in conjunction with rehabilitation program can provide the window of opportunity to proceed with effective rehabilitation program.[7]

Regional nerve block is effective for managing acute or chronic pain.[8, 9] Among various nerve block techniques, suprascapular nerve block is an effective, simple, and practical method for the management of shoulder pain.[8,10-12] It can be performed in the clinic using anatomical landmarks to determine needle placement.[13]

The aim of the study was to compare the effectiveness of SSNB versus intraarticular steroid injection, in management of chronic shoulder pain and to assess the effectiveness of these methods, improve range of movement of the shoulder and to demonstrate the most suitable method for treatment of such patients.

Materials and Methods

This quasi experimental study was conducted over duration of 1 year and 2 months from August 2011 to September 2012 in the orthopedic unit of Pakistan Railway Hospital Rawalpindi. As such, they had a loss of movement (most loss of external rotation, then abduction, and least loss of internal rotation). With pain that was constant, radiated beyond the elbow, or disturbed sleep. All resisted movements produced no pain. Serious pathology was excluded by measurement of ESR, random blood glucose, and rheumatoid factor.

Suprascapular nerve block: A mixture of 40 mg Triamcinolone acetonide and 9.5 ml 0.5% Bupivacaine Hydrochloride (Marcain) was injected using the technique described by Dangoisse *et. al.*[7] (Figure1). A 21G × 1.5" needle was introduced through the skin 2 cm cephaloid to the midpoint of the spine of the scapula (Figure 1). The needle was advanced parallel to the blade of the scapula until boney contact was made in the floor of the suprascapular fossa. This technique has previously been demonstrated to be safe and to effectively block the articular branches of the suprascapular nerve. The injection was not repeated. The need to include a steroid in the injection has been debated;[9] we chose to include it to minimize the differences between the treatment groups.

Following each treatment, all patients were given verbal and written instructions regarding a home exercise programme of self-mobilization, joint-stretching, and static rotator cuff strengthening. Patients were asked to take only paracetamol for pain relief.

Intraarticular injection: The solution injected contained 1cc of 2% lidocaine HCL and 2cc (80 mg) methylprednisolone acetate .All patients were injected once. The posterior approach was used to inject glenohumeral joint. The site of entry was same as used for traditional posterior portal for arthroscopy of shoulder. This portal is located 2 to 3 cm inferior and 1 cm medial to the posterolateral tip of the acromion. At this site the attempt was made to pass through the posterior soft spot between the infraspinatus and teres minor muscles. An 18 gauge spinal needle was inserted in this site with tip pointing towards coracoids process anteriorly. The index and middle finger was placed on the coracoid process to direct the tip of needle anteromedially towards the coracoid. When in right direction, the needle faces little resistance on entering the joint.

Assessment

Pain levels and range of movement were recorded at initial attendance and after two weeks, six weeks, eight weeks, and twelve weeks. To avoid bias, patients graded their pain using the scale in Table I. The sum of the three columns was recorded as the total pain score. Range of movement was measured using a goniometer in three planes: abduction and external rotation. No attempt was made to isolate gleno-humeral movement, as total shoulder movement gave more reproducible results and is a better gauge of function. Data was entered into performa and was analysed using SPSS 12.

Table I. Scale used to grade severity of pain.

Score	Pain	Radiation	Sleep disturbance
0	None	None	None
1	Mild, intermittent	To elbow	Mild
2	Mild, constant	To wrist	Moderate
3	Moderate	To hand	Severe
4	Severe	-	-
5	Very severe	-	-

TableII: Comparison of the two treatment groups at initial assessment

Group Study	Age	Male / female	Simple pain score	Total pain score	Abduction	External rotation
Suprascapular nerve block group I	40 – 60 yrs	13 / 07	4	8	90	20
Intararticular injection group II	40 – 60 yrs	12/08	3	7	100	30

Table III: Pain scores and range of movement in suprascapular nerve block (SNB) and intra-articular groups (IA).

Duration	Simple pain score		Total pain score		Abduction		External rotation	
	SSNB	IA	SSNB	IA	SSNB	IA	SSNB	IA
Initial	4	3	8	7	90	100	20	30
week 2	2	2	6	5	120	110	40	40
week 6	1	2	3	4	140	130	70	60
Week 8	1	2	1	3	160	140	80	60
Week 12	1	2	1	3	180	150	80	60

Results

The study included 40 frozen shoulder patients. The mean age of the patients was 49.4 $\pm$ 9.97 years and the range was between 40-60 years. There were 16 (40%) females and 24 (60%) males. All patients diagnosed as cases of frozen shoulder were divided into two groups randomly. Patients were placed alternately into the two groups. The group I patients received SSNB while group II received intraarticular injection. After the injections all patients were advised home exercises. Patients were serially followed for three months after 2, 6, 8 and 12 weeks time.

Group I had 13 males and 7 females, their ages were 49.4 $\pm$ 9.97 with disease duration ranged between 3-12 months. While the ages of group II was also the same, disease duration ranged between 3.5-12months and it included 12 males and 8 females. Both Groups did not differ significantly at baseline for personal characteristics as age, sex, disease duration. All the patients recovered in the mean time of six weeks. (Range 3 weeks to 12 weeks). Three patients did not meet the recovery criteria within three months after injection. These patients did not strictly follow the home exercise routine advised after SSNB and intra-artriculer injection.

At base time, no significant difference was found between two groups as regard to pain, disability and total pain scores. Pain improved significantly in all times of follow up with best improvement in group I.

Range of active movements showed no significant differences at base time between the two groups. Over the 4 time periods, abduction & flexion and external rotation showed significant differences in all groups with gradual improvement from week 2 to week 6 to week 8 to week 12.

No complication occurred in SSNB group.

While four patients in intra-articular injection complained of shoulder pain anteriorly. Three patients claimed that the pain relieved in 2 to 3 days time. But only one patient remained in distress at first assessment. At final assessment no patient claimed of any side effects of the intervention. Statistical analysis revealed a significant difference in the recovery of the patients of two groups of frozen shoulder.

intra-articular
oss tabulation

Count		Pain relieved		
		mild, intermittent	mild,constant	Total
site of injection intra-articular	Yes	0	20	20(p value < .005)
	no	20	0	20(p value < .005)
	Total	20	20	40(p value < .005)

suprascapular
oss tabulation

Count		Pain relieved		
		mild, intermittent	mild,constant	Total
Site of injection suprascapular	yes	20	0	20(p value < .005)
	no	0	20	20(p value < .005)
	Total	20	20	40(p value < .005)

intra-articular
oss tabulation

Count		range of motion			
		abbduction	external rotation	abduction& external rotation	Total
site of injection intra-articular	Yes	6	11	3	20(p value < .005)
	No	0	2	18	20(p value < .005)
	Total	6	13	21	40(p value < .005)

Table VII: Site of injection suprascapular * range of motion Cross tabulation

Count		Range of motion			
		abbduction	external rotation	abduction& external rotation	Total
Site of injection suprascapular	Yes	0	2	18	20(p value < .005)
	No	6	11	3	20(p value < .005)
Total		6	13	21	40(p value < .005)

Both the methods used are significant as per statistical value but SSNB give early and long term pain relief and range of motion than intra-articular nerve block.

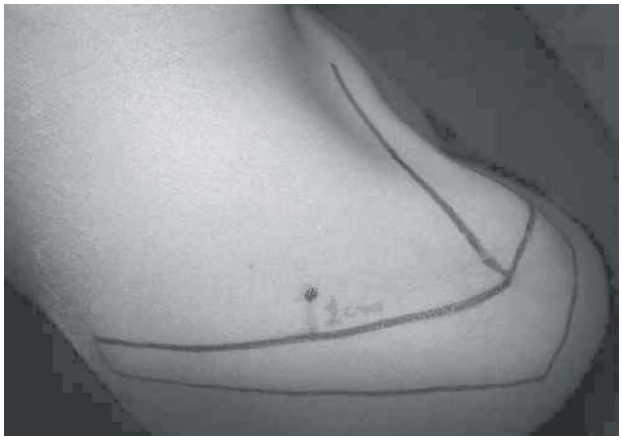

Figure 1: Dangoisse technique. Posterior shoulder view; the needle is inserted 1 cm above the middle of the spine of scapula to the floor of the supraspinatus fossa.
AC: acromion; CL: clavicle; SS: spine of scapula.

Discussion

The results of our study show a clear benefit from the use of suprascapular nerve block using
bupivacaine and methylprednisolone over intra- articular steroid injection in patients with frozen shoulder. There were statistically and clinically significant reduction in pain and disability. This benefit was prolonged, with benefit still present at 12th week. The improvement in these

parameters are better or at least comparable with published studies examining NSAIDs or intra-articular steroid injection.[14-16] Not much literature is present on the comparison study of SSNB and intra-articular steroid injection for the treatment of frozen shoulder There were no significant side effects from the injection, which was well tolerated by most of the patients.

The SSNB is an effective and safe pain treatment in chronic diseases that affects the shoulder, and has been widely used by professionals in clinical practice such as rheumatologists, orthopedists, neurologists, and pain specialists. The pain in this joint is a frequent complaint and leads to significant functional disability and reduced quality of life of the affected patients. When properly indicated, SSNB should be considered.

Shoulder pain and restriction of glenohumeral movements are the main clinical findings in frozen shoulder. Three sequential phases are described in its clinical course.[8] After the painful and stiff phases, the last phase, the resolution phase, is a self-limited membrane of the joint are innervated via axillary, suprascapular, subscapular, and musculocutaneous nerves. The suprascapular nerve, which provides sensory fibers to approximately 70% of the shoulder joint has afferent, efferent, and sympathetic fibers.[12] The efferent fibers innervate the supraspinatus and infraspinatus muscles. The afferent fibers distribute to the articular capsule and ligaments of the glenohumeral and acromioclavicular (AC) joints and to the periosteum and tendons of the scapula. Significant pain relief can be produced if the nerve block can be performed before it gives off to its articular branches.[8, 12]The most appropriate site is around the suprascapular notch, in which the nerve can also be located easily. Prominent pain relief is a natural consequence of the regional block of the suprascapular nerve that innervates a wide portion of the shoulder joint.[8]

Various suprascapular nerve block techniques have been described by several investigators.[11, 12, 14] Dangoisse et al described indirect suprascapular nerve blocks, using anatomical landmark.[14]

We have demonstrated that suprascapular nerve block is efficacious over intra-articular steroid injection without the need to image the area, by ultrasound or fluoroscopy during the procedure. This study shows that this treatment not only reduces pain but also decreases disability and gives clinicians a proven efficacious treatment for patients with frozen shoulder. Whether the efficacy would be further improved with guidance of the needle under direct imaging is unknown. Longer period of pain relief and combination of nerve block with other approaches to pain relief would also be a potentially worthwhile area to study.

It is not clear how the nerve block acts to produce a resolution of the symptoms. As the direct action of Bupivacaine cannot extend beyond a few hours or days there must be an effect on the underlying pathology, which owes in part to the patient's ability to perform an adequate exercise programme. The Triamcinolone included in the injection may have a systemic anti-inflammatory effect, but this should be the same in both groups. A more definitive study could also have a third group of patients treated by nerve block without steroid. Since the nerve block produces a faster resolution, its widespread use could produce a saving of time and

further economic benefits if patients are able to return to work sooner.

Conclusion

Combination of physical treatments with suprascapular nerve block significantly improve outcome in chronic shoulder pain, and can be more effective than conventional treatments, offering clear advantages (ease of application, low cost, rare side effects) considering that the top priority of a pain control program is restoring the function of the affected area. Further, it may prove to be a useful treatment for patients who are unfit or unwilling to consider manipulation under anesthesia.

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