

# Suprascapular Nerve Block in the Treatment of Frozen Shoulder

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## ABSTRACT

- Objective** To determine the effectiveness of suprascapular nerve block in the treatment of frozen shoulder.
- Study design** Quasi experimental study.
- Place & Duration of study** Department of Orthopedic Surgery Hayatabad Medical Complex Peshawar, from March 2010 to December 2010.
- Methodology** Patients with frozen shoulder received a single suprascapular nerve block. Shoulder pain and disability index (SPADI) were used as main outcome measure of pain and disability.
- Results** There were total of 64 patients in this study. The mean age was 65.3 ±10.1 year. Using SPADI, the mean baseline total, subscale pain and disability scores were 70.9±6.8, 72.3±6.9 and 69.5±8.5 respectively which improved to 24.6 ±5.6, 22.3±5.3 and 27.5±6.6 respectively at 4 week of suprascapular nerve block of the affected shoulder with p value of 0.000 each.
- Conclusion** Suprascapular nerve block is safe and effective treatment for relieving pain and decreasing disability in frozen shoulder.
- Key words** Frozen shoulder, Suprascapular nerve block, Disability.

## INTRODUCTION:

Frozen shoulder (adhesive capsulitis) is characterized by a painful, gradual loss of both active and passive glenohumeral motion resulting from progressive fibrosis and ultimate contracture of the glenohumeral joint capsule.<sup>1,2</sup> Variable nomenclature, inconsistent reporting of disease stage and a multitude of different treatments have created a confusing and contradictory body of literature about this condition.<sup>1</sup>

Many treatments have been reported in the literature including rest, non-steroidal anti-inflammatory drugs (NSAIDs), active and passive mobilization, physiotherapy, intra articular corticosteroids, hydro dilatation, manipulation under anesthesia, arthroscopic capsular release, intra-articular hyaluronate injection and regional nerve block etc.<sup>3-9</sup> Pain relief and restoration of normal shoulder

function are the common aims of the treatment in frozen shoulder. To achieve this goal, therapeutic exercises are the most important, and the patient must be willing to cooperate and take an active part in this program. The most important factor preventing active exercise is pain.

Regional nerve block is effective for managing acute or chronic pain.<sup>2,10</sup> Among various nerve block techniques, suprascapular nerve block is an effective, simple, and practical method for the management of shoulder pain.<sup>2,11-13</sup> It can be performed in the clinic using anatomical landmarks to determine needle placement.<sup>14</sup> Suprascapular nerve block in most studies consists of 10 ml of 0.5% bupivacaine hydrochloride and 40 mg of methylprednisolone acetate. This study evaluates the clinical effectiveness and safety of suprascapular block using anatomical landmarks in the treatment of frozen shoulder.

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## METHODOLOGY:

This Quasi experimental study was conducted in the outpatient department of Orthopedic unit, Hayatabad Medical Complex, Peshawar from March 2010 to December 2010. Ethical approval was taken from

the institutional review and ethics board. After obtaining written, informed consent, 64 patients clinically diagnosed as having frozen shoulder, were included in the study. Inclusion criteria were shoulder pain and stiffness in one or both shoulders for at least 4 weeks, restricted active range of motion (AROM) and passive range of motion (PROM) at the glenohumeral joint, pain at night causing sleep disturbance and inability to lie on the affected side, no history of recent trauma and no previous injection in the involved shoulder, no history of allergy to local anesthetics, and no medical condition such as coagulation disorders that would significantly increase the risk of local injection. Patients were excluded if they had arthritis or bony or neurologic disorders that might be an alternative cause of the shoulder pain and patients who lost to follow at 4 weeks as these confounding variables result in bias.

The active treatment required the anatomical landmark approach, involved 11 ml injection into the suprascapular fossa with 10 ml of 0.5% bupivacaine and 40 mg of methylprednisolone. The method of the injection was that described by Dangoisse.<sup>16</sup> Anatomical landmarks were used to identify the injection site. Patients were seated and a line drawn along the length of the spine of the scapula. This was bisected with a vertical line drawn from the angle of the scapula dividing the scapula into quadrants. After skin preparation, a 21 G×38 mm needle was introduced through the skin 2.5 cm along the line of the spine in the upper outer quadrant. The needle was directed over the spine in the plane of the scapula and advanced to the hub of the needle or until contact was made with the floor of the suprascapular fossa. After attempted aspiration, the agent was slowly injected to fill the fascial contents of this fossa to produce an indirect suprascapular nerve block. At this point the suprascapular nerve gives off branches to supply the glenohumeral joint, the acromioclavicular joint, and the supraspinatus muscle. Patients were sent home after completion of the procedure and advised paracetamol 500 mg three times a day and physiotherapy for four weeks.

Baseline data, including shoulder pain and disability index (SPADI), and visual analogue scale for pain intensity at rest, at night and pain on movement, were gathered before the injection and follow up data were gathered after 4 weeks of suprascapular nerve block. All the data was collected with the help of proforma.

Shoulder pain and disability index or SPADI were our outcome measure of pain and disability. The SPADI is a self-administered index consisting of 13

items divided into two subscales, pain and disability. It has functioned well on testing in older populations, particularly in older men. It shows good internal consistency, test-retest reliability, and criterion and constructs validity. It can detect change over time and accurately discriminates between patients who have improved or worsened.<sup>15</sup> Pain measured on the visual analogue scale was considered a second major end point of the study.

## RESULTS:

Sixty four patients were selected for study with frozen shoulder. Twenty seven (42.2%) were males and 37 (57.8%) females. In 25(39%) patients the right sided (dominant) shoulder was affected while in 39 (61%) patients the left sided (non-dominant) shoulder was involved. The mean age of the patients included in this study was 65.3 ±10.1 year with range of 48 to 85 year.

The mean baseline total SPADI, base line subscale pain and disability score were 70.9±6.8, 72.3±6.9 and 69.5±8.5 respectively which improved to 24.6 ±5.6, 22.3±5.3 and 27.5±6.6 respectively at 4 week of suprascapular nerve block of the affected shoulder. When compared statistically a highly significant p value of 0.000 each was obtained. Table I and table II summarize the data.

Using Visual analogue scale (VAS) 100 mm for pain intensity, mean baseline pain at rest, pain at night and pain on movement were 65.0±7.4, 61.3±7.0 and 74.7.5±7.2 respectively which improved to 20.8 ±4.5, 18.8±3.9 and 28.2±5.4 respectively at 4 week of suprascapular nerve block of the affected shoulder. When compared statistically a highly significant p value of 0.000 each was obtained.

## DISCUSSION

The results of this study show a clear benefit from the use of suprascapular nerve block using bupivacaine and methylprednisolone 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 4<sup>th</sup> week. The improvement in these parameters are better or at least comparable with published studies examining NSAIDs or intra-articular steroid injection.<sup>16-18</sup> There were no significant side effects from the injection, which was well tolerated by most of the patients.

Shoulder pain and restriction of glenohumeral movements are the main clinical findings in frozen shoulder. Three sequential phases are described in its clinical course.<sup>2</sup> After the painful and stiff phases, the last phase, the resolution phase, is a self-limited

Outcome measure (maximum score)	Mean Standard Deviation	p-value
Baseline SPADI – total (100)	70.9±6.8	0.000
SPADI – total (100) after 4 weeks	24.9±5.6	
Baseline SPADI – pain (100)	72.3±6.9	0.000
SPADI – pain(100) after 4 weeks	22.3±5.2	
Baseline SPADI – disability (100)	69.5±8.5	0.000
SPADI – disability(100) after 4 weeks	27.5±6.8	
Baseline Pain at rest (100)	65.0±7.4	0.000
Pain at rest after 4 weeks	20.8±4.5	
Baseline Pain at night (100)	61.4±7.0	0.000
Pain at night after 4 weeks	18.8±3.9	
Baseline Pain on movement (100)	74.7±7.2	0.000
Pain on movement after 4 weeks	28.2±5.4	

Outcome measure (maximum score)	Paired Differences	Standard Deviation	95% Confidence Interval of the Difference	
	Difference in mean change between baseline and at 4 weeks		Lower	Upper
Baseline SPADI – total (100) - SPADI – total (100) after 4 weeks	4.6	4.7	44.8	47.1
Baseline SPADI – pain (100) - SPADI – pain(100) after 4 weeks	4.9	5.8	48.5	51.4
Baseline SPADI – disability (100) - SPADI – disability(100) after 4 weeks	4.2	6.2	40.5	43.6
Baseline Pain at rest (100) - Pain at rest after 4 weeks	4.4	5.9	42.8	45.7
Baseline Pain at night (100) - Pain at night after 4 weeks	4.3	5.7	41.2	44.0
Baseline Pain on movement (100) - Pain on movement after 4 weeks	4.7	6.0	45.0	48.0

period that is characterized by slow and gradual improvement in ROM. The rate of recovery is variable and frequently incomplete.<sup>2,19</sup> In long-term follow-up studies, 33% to 61% of the patients had residual restriction of motion, and 7% to 15% had functional disability.<sup>19</sup> Considering the functional disability, the most important components of the treatment are pain relief and therapeutic exercises for early mobilization. After the pain reduction, an effective treatment can be accomplished by the cooperation

and active participation of the patient. Muscle guarding because of pain can be reduced, and stretching can be performed up to the available limit of motion.<sup>2</sup>

A simple and effective regional nerve block method for shoulder pain is the suprascapular nerve block. After the suprascapular nerve block, shoulder pain diminish, and an effective, relatively pain-free therapeutic exercise program can be performed. Ligaments, articular capsule, and synovial

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.<sup>15</sup> 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.<sup>2,15</sup> 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.<sup>2</sup>

Various suprascapular nerve block techniques have been described by several investigators.<sup>11, 13,16</sup> Dangoisse et al described indirect suprascapular nerve blocks, using anatomical landmark.<sup>16</sup> This type of approach is easy and decreases the risk of pneumothorax. It can be performed by most trained specialists. Dosage of the local anesthetic sufficient for the neural blockade may be a disadvantage of this technique.

The low incidence of reported side effects is an advantage. Pneumothorax has been reported as a complication of this procedure.<sup>20</sup> However, in our experience we had no such events. Our findings in this trial confirm that the approach of Dangoisse is safer than previous methods. Our safety record is consistent with that of other recent studies using this method.<sup>11</sup> We believe that the use of the standard needle makes this complication very unlikely. The 11 ml volume allows the mixture to suffuse to the region of the notch and nerve. In addition, the procedure is easy to learn and has a short "learning curve". Small sample size, patients followed once after four weeks and suprascapular block not compared with placebo injection or other well established methods of treatment in frozen shoulder, are potential limitation of our study.

We have demonstrated that suprascapular nerve block is efficacious 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.

#### CONCLUSIONS:

This study provides evidence that suprascapular nerve block is a safe, effective, and well tolerated treatment for patients with frozen shoulder. It can be performed in an outpatient department and provides the clinician with an alternative or additional approach to oral drug treatment and intra-articular injection. 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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