

Management of Periarthritis of Shoulder Joint by Supra-scapular Nerve Block

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ABSTRACT

Periarthritis is a chronic, inflammatory disorder of the shoulder and surrounding soft tissues, caused by injury, leading to pain and lack of use. Various therapeutic methods and surgical treatments have been introduced for shoulder periarthritis. This observational study was carried out on 16 patients clinically and radiologically diagnosed with periarthritis of shoulder to assess the efficacy of SSNB in the treatment of periarthritis of the shoulder. In this study the mean abduction increased and reached from $72.3^\circ \pm 3.10^\circ$ to $116.3^\circ \pm 4.8^\circ$ at the follow-up of 12-weeks. Mean flexion, mean internal rotation and mean external rotation shows an improvement of 41.50, 19.8° and 23.50 respectively at 12-weeks follow-up. The mean VAS score was 7.25 ± 0.9 , which shows a significant reduction at different time intervals. In this study we conclude that supra-scapular nerve block (SSNB) is an effective method for controlling pain and accelerating recovery of shoulder motion in patients with periarthritis of shoulder.

Keywords: Chronic Shoulder Pain, Periarthritis of Shoulder, Supra-Scapular Nerve Block

INTRODUCTION

Periarthritis of the shoulder is a condition characterized by painful and global restriction of active and passive glenohumeral range of motion in at least two directions most notably shoulder abduction and external rotation.^[1] Periarthritis of the shoulder has an incidence of 3%–5% in the general population and up to 20% in those with diabetes.^[2] It has prevalence rate of 2%–5%.^[3] Periarthritis is a chronic, inflammatory disorder of the shoulder and surrounding soft tissues. This condition is frequently caused by injury, leading to pain and lack of use. As the joint becomes progressively tighter and stiffer, simple movements such as raising the arm become difficult.

Periarthritis is also referred to as frozen shoulder or adhesive capsulitis and is more common in females, peaks in 40–60 years of age group and 10 times more in diabetic patients. It is observed most often in middle and old age, if not treated it can lead to extreme rigidity of the arm and to an immobile shoulder. X-ray diagnosis plays an essential role in detecting the disease.

Despite the self-limiting nature of this condition, some patients may benefit from treatment to shorten the recovery period, relieve symptoms and reduce mobility limitations.^[4] Various therapeutic methods have been introduced for shoulder periarthritis as, non-surgical options including physiotherapy, NSAIDs, intra-articular steroid injections, supra-scapular nerve block (SSNB), platelet-rich plasma

(PRP) injection. The proposed surgical treatments include manipulation under general anesthesia, or arthroscopic capsular release.^[5,6] All these modalities have their limitations particularly in patients with comorbidities and older age. Bearing in mind that supra-scapular nerve block is a safe method that its therapeutic effects can immediately be seen. The supra-scapular nerve is a mixed motor and sensory peripheral nerve arising from the superior trunk of the brachial plexus. The nerve supplies motor innervation to shoulder muscles and sends sensory branches to multiple places in the shoulder region.^[7] Supra-scapular nerve block (SSNB) is a safe and effective method to treat pain in chronic diseases that affect the shoulder. SSNB was first described in 1941 by Wertheim and Rovenstein.^[8] Since then, SSNB has been applied in the management of acute and chronic pain.^[9,10] Advantages of SSNB include its simplicity and cost-effectiveness.^[11] This method has no complications associated with taking nonsteroidal anti-inflammatory drugs (NSAIDs)^[12], but some studies have not yielded satisfactory SSNB results.^[13,14] Therefore, this study aims to assess the efficacy of SSNB in the treatment of periarthritis of the shoulder joint.

MAERIAL AND METHODS

This observational study was carried out on 16 patients clinically and radiologically diagnosed with periarthritis of shoulder to assess the efficacy of SSNB in the treatment of periarthritis of the shoulder joint from in the department of Orthopaedics, SDH Bijbahara from June 2020 to May 2022. The enrolled patients were with pain, restricted shoulder joint mobility in any plane of <25% especially abduction and external rotation for more than a month duration and inability to use the affected arm for daily activities of life and pain at night causing sleep disturbances and inability to lie on the affected side. The patients who had pain and stiffness in one or both the shoulders for at least 4 weeks, restricted active and passive range of motion at the glenohumeral joint and age of ≥ 40 and ≤ 60 years were included in the study. Patients with chronic shoulder pain due to other causes such as nerve damage or neurologic disorders, any skin problems including trauma and infection over the affected shoulder, history of

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fracture around the shoulder joint, patient following shoulder surgery, uncontrolled diabetes were excluded from the study.

Procedure

All supra-scapular nerve blocks were done by the same doctors indirectly in the supra-scapular nerve site under ultrasonographic guidance. All patients were in sitting position with hand on opposite shoulder. The skin was sterilized with antiseptic solution and a sterile dressing applied to the probe surface. Once the supra-scapular notch was identified, a mixture of 40 mg methylprednisolone acetate and 5 mL 1% lidocaine was injected using 21 G × 50 mm needle, using a medial to lateral approach toward the scapular notch. A successful injection was confirmed by cephalad displacement of the transverse scapular ligament.

Active range of movements including abduction flexion and external rotation at 0 degree abduction were measured using a goniometry, internal rotation were measured by the ability of patient to reach his back with his hand (vertebral levels) by the same doctor. The visual analog scale (VAS) from 0 to 10 was utilized to evaluate the patients' pain and range of movement, were recorded active at initial attendance and after 1, 4, and 12 weeks post-injection.

RESULTS

The mean age of the patients was 49.52 ± 7.16 (range 43-59) years. There were 13 (72 %) men and 5 (28 %) women in this study. In this study maximum patients 9 (50 %) were in the age group of 41-50 years.

In this study the mean abduction before intervention was $72.3^\circ \pm 3.10^\circ$. At the follow-up of 12-weeks the abduction ROM increased and reached $116.3^\circ \pm 4.8^\circ$ after intervention. The mean flexion shows an improvement of 41.5° at 12-weeks follow-up, from $76.2^\circ \pm 3.9^\circ$ to $117.7^\circ \pm 3.7^\circ \pm 3.9^\circ$. The mean internal rotation shows a significant increase of 19.8° , from, $34.3^\circ \pm 3.7^\circ$ (before intervention) to $54.1^\circ \pm 3.9^\circ$ (at 12 weeks follow-up). The mean external rotation was $51.6^\circ \pm 4.2^\circ$ before the intervention and after the intervention at 12 weeks follow-up, the ROM of external rotation increased to $75.1^\circ \pm 3.5^\circ$, with a significant increase of 23.5° (Table 1).

In this study initial mean and standard deviation of VAS scores was 7.25 ± 0.9 , which shows a significant reduction at different time intervals. The mean VAS scores at 1, 4 and

12 weeks follow-up was 3.2 ± 0.7 , 0.9 ± 0.3 and 0.4 ± 0.1 respectively (Table 2).

DISCUSSION

Periarthritis is a chronic, inflammatory disorder of the shoulder and surrounding soft tissues. This condition is frequently caused by injury, leading to pain and lack of use. Periarthritis is also referred to as frozen shoulder or adhesive capsulitis and is more common in females, peaks in 40–60 years of age group and 10 times more in diabetic patients. As the joint becomes progressively tighter and stiffer, simple movements such as raising the arm become difficult. Inflammation is an important event that leads to stiffness, pain, and capsular fibrosis.^[15] Inflammatory cytokines such as (tumor necrosis factor)-alpha, interleukin (IL)-1 alpha, IL-1 beta, and IL-6 are known to appear both in the glenohumeral and subacromial bursa.^[16] Fibroblast/myofibroblast with abundant type 3 collagen deposition is seen on the coracohumeral ligament and rotator interval capsule. The absence of multiplication is seen at the superficial synovial layers.

Many treatments have been reported in the literature including rest, non-steroidal anti-inflammatory drugs (NSAIDs), active and passive mobilization, intra-articular corticosteroids, hydro dilatation, manipulation under anesthesia, arthroscopic capsular release, intra-articular hyaluronate injection and supra-scapular nerve block etc. However, it is difficult to treat and there are limited data on the comparative efficacy of various interventions. All these modalities have their limitations particularly in patients with comorbidities and older age. This study aims to assess the efficacy of supra-scapular nerve block (SSNB) in the treatment of periarthritis of the shoulder joint. Bearing in mind that supra-scapular nerve block is a safe method that its therapeutic effects can immediately be seen.

The mechanism of the SSNB effect has not been precisely specified. The supra-scapular nerve provides 70% of shoulder joint sensory fibers, and its block definitely affects pain relief. Due to decreased pain, patients have better results. However, we know the direct effect of lidocaine is limited to hours or a few days; hence, this block will certainly affect the underlying disease pathology.

Several mechanisms have been proposed in various papers

Range of motion	Time intervals			
	Before Intervention	At 1-Week	At 4-Weeks	At 12-Weeks
Abduction ⁰	72.7 ± 3.10	93.2 ± 5.4	109.8 ± 5.7	116.3 ± 4.8
Flexion ⁰	76.2 ± 3.9	95.1 ± 4.8	110.1 ± 5.2	117.7 ± 3.7
Internal rotation ⁰	34.3 ± 3.7	39.8 ± 4.1	48.6 ± 4.8	54.1 ± 3.9
External rotation ⁰	51.6 ± 4.2	59.2 ± 5.0	70.30 ± 4.4	75.1 ± 3.5

Table-1: Mean range of motion before intervention, at 1, 4 and 12 weeks follow-up

Time intervals	Mean VAS score	SD
Before Intervention	7.25	0.9
After 1-Week	3.2	0.7
After 4-Weeks	0.9	0.3
After 12-Weeks	0.4	0.1

Table-2: Mean VAS score of study population at different time intervals

as, reducing the central sensitivity of the posterior horn of nociceptive neurons (wind down) after the drop-in input impulses of peripheral nociceptive neurons^[17] and longer effect due to the reduction in P substance and nerve growth factor after the block implementation in the synovium and efferent nerve fibers of the glenohumeral joint.^[18] Three-direct infiltration of supra-spinatus muscle and block of nerve fibers feeding this muscle as well as possible block of infraspinatus muscle (downstream).^[10] The supra-scapular nerve is aligned with the omohyoid muscle, passes under the trapezius muscle and is located in the supra-scapular notch after passing through the transverse scapular ligament. This notch is on the top of the scapula and on the inner side of the coracoid process. The nerve passes the top of the notch with the artery and supra-scapular vein.^[19] The best control of pain occurs when the pre-nerve block is applied to these articular branches of the nerve.^[20] The most appropriate point is around the supra-scapular notch in which the nerve can be easily localized.^[21]

Various studies have introduced different methods for SSNB injection.^[22] In the present study, the SSNB method included a single injection of lidocaine and methylprednisolone acetate that was indirectly under sonographic guide in the supra-scapular nerve site. The supra-scapular nerve is aligned with the omohyoid muscle, passes under the trapezius muscle and is located in the supra-scapular notch after passing through the transverse scapular ligament. This notch is on the top of the scapula and on the inner side of the coracoid process. The nerve passes the top of the notch with the artery and supra-scapular vein.^[19] The best control of pain occurs when the pre-nerve block is applied to these articular branches of the nerve.^[20] The most appropriate point is around the supra-scapular notch in which the nerve can be easily localized.^[21] In the present study, the injection was performed in the same point under the sonographic guide. This method is a safe approach and can have minimal complications if performed by an experienced individual with an accurate determination of the injection site using anatomical landmarks.^[19]

In this study there was a significant decrease in pain, increase in activity level, arm position, strength of abduction, flexion, abduction, external rotation, and internal rotation which were measured by orthopedic goniometer and spring balance after SSNB at 1, 4 and 12 weeks follow-up. Adam et al. have reported average improvement in abduction of 86.92°, and external rotation of 32°. They have further reported significant improvement in pain and achieved almost normal day to day activity after SSNB in adhesive capsulitis.^[23] According to Shanahan et al., there was a significant improvement in the group receiving SSNB than the control group. Venkat et al. reported that the patients who underwent US-guided nerve block had more significant pain relief, and the effect was more-longer than the patients who had nerve block by traditional blind technique.^[24]

CONCLUSION

Supra-scapular nerve block (SSNB) is an effective method for controlling pain and accelerating recovery of shoulder

motion in patients with periarthritis of shoulder.

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