

Research Article

Suprascapular Nerve Block versus Glenohumeral Intraarticular Injection for Treatment of Chronic Shoulder Pain - A Comparative Study

Seema K^{*1}, Sumitra S², Susheel S³, Ajay KS⁴

Department of Anaesthesiology & Critical Care, Pt. B.D. Sharma PGIMS, Rohtak, Jaipur, Rajasthan, India

Department of Orthopedics, S M S Medical College, Jaipur, India

Department of Pediatrics, NIMS medical college, Jaipur, India

Department of Pediatrics, SGMH, Delhi, India

***Corresponding Author:** Seema Kumari, Department of Anaesthesiology & Critical Care, Pt. B.D. Sharma PGIMS, Rohtak, Haryana, India

Received: 24 May 2022; **Accepted:** 03 June 2022; **Published:** 24 June 2022

Citation: Seema K, Sumitra S, Susheel S, Ajay KS. Suprascapular Nerve Block versus Glenohumeral Intraarticular Injection for Treatment of Chronic Shoulder Pain - A Comparative Study. Anesthesia and Critical care 4 (2022): 118-127.

Abstract

Objective

To evaluate and compare the suprascapular nerve block and glenohumeral intraarticular joint injection in treatment of chronic shoulder pain

Study design

The present prospective randomized study was conducted in the Department of Anaesthesiology and

Critical Care, Pt. B.D. Sharma PGIMS, Rohtak. Fifty patients of either sex, between 40-80 yrs of age, with chronic shoulder pain. The patients were randomly divided in two groups of 25 patients each. Patients received either suprascapular nerve block under ultrasound guidance or intraarticular injection using anterior approach.

Results

Mean age, sex distribution and duration of symptoms in each group were comparable. There was an overall significant ($p < 0.05$) improvement in all range of shoulder movements i.e. flexion, extension, abduction, internal rotation and external rotation in both the groups from the baseline value immediately following the block which was maintained at 1 week and at 4 weeks after the procedure. The improvement of movement in Group I (suprascapular nerve block) was statistically significant ($p < 0.05$) as compare to Group II (intraarticular injection) for flexion, abduction, and internal rotation at all time during follow up.

Conclusions

Both suprascapular nerve block and glenohumeral intraarticular injection are safe and effective methods for management of chronic shoulder pain. Suprascapular nerve block is superior to intraarticular injection with regard to improvement of pain, range of motion and functional activity.

1. Objective

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Chronic shoulder pain is a pain that persists for more than three months and it may be associated with restricted range of movement. Shoulder pain has a prevalence of 15-30% in the adult population. Conditions that result in chronic shoulder pain include rotator cuff injury, adhesive capsulitis (frozen shoulder), calcifying tendinitis, rheumatoid arthritis, stroke sequel, shoulder arthritis, shoulder instability and tumors. Combined steroid

and local anaesthetic injections at various sites can be used alone or as an adjuvant to physical therapy. Various local sites for combined steroid and local anaesthetics injections for pain relief of chronic shoulder pain include intraarticular shoulder injection, subacromial infiltration, injection in the sheath of biceps tendon for biceps tendinitis and suprascapular nerve block [1-6]. The suprascapular nerve (SSN) is a mixed nerve which contains both sensory and motor fibers, accounting for 70% of sensory supply to the shoulder joint, mainly the posterior and superior capsule. The Suprascapular nerve block was first described by Wertheim and Rovenstine in 1941 since then it has been used for management of acute and chronic shoulder pain as well as for diagnosis of suprascapular neuropathy [7]. Glenohumeral joint is a type of synovial ball and socket joint between the rounded head of humerus and the shallow, pear shape glenoid cavity of the scapula. Corticosteroid injection directed to glenohumeral joint has been used for many years to relieve the symptoms of various shoulder conditions. On extensive medical literature search it was found that there is paucity of literature to compare suprascapular nerve block with glenohumeral intraarticular injection using ultrasound guidance for management of chronic shoulder pain. Hence we conducted the present study.

2. Methods

The present prospective randomized study was conducted in the Department of Anaesthesiology and Critical Care, Pt. B.D. Sharma PGIMS, Rohtak. Fifty patients of either sex, between 40-80 yrs of age, with chronic shoulder pain due to adhesive capsulitis and

shoulder arthritis (VAS ≥ 4), of duration more than three months not responding to at least two weeks of oral analgesics and conservative therapy, referred to pain clinic were enrolled in this study. Patients with known contraindications for regional block (e.g. infection at the site of Block, coagulopathy), history of adverse reactions to steroids and bupivacaine and those who had uncontrolled diabetes mellitus were excluded. Patients having infection, trauma, tumour and severe osteoporosis of shoulder joint were not included in the study. All patients were subjected to detailed history and clinical examination. Investigations like haemoglobin, bleeding-time, clotting-time, random blood sugar and x-ray shoulder (anteroposterior view) were performed. Other investigation like ultrasound shoulder, MRI and rheumatoid factor etc. done and reviewed. Informed written consent was obtained from all the patients after explaining the procedure in detail. Patients were familiarized with the use of Visual analog scale (0-10cm) for assessment of pain where 0 is no pain and 10 is worst pain imaginable. Pain and disability was calculated using shoulder pain and disability index (SPADI), which is a self-administered questionnaire that consists of two dimensions, one for pain and the other for functional activities. The pain dimension consists of five questions regarding the severity of an

individual's pain, while dimensions for functional activities are assessed with eight questions designed to measure the degree of difficulty an individual has with various activities of daily living that require upper-extremity use. While answering the questions, patients placed a mark on a 10cm visual analogue scale for each question. Verbal anchors for the pain dimension were 'no pain at all' and 'worst pain imaginable' and those for the functional activities were 'no difficulty' and 'so difficult it required help'. The interpretation of scores was assessed as total pain score:-----/50 X 100% , total disability score:-----/80 X 100% and total SPADI score:-----/130 X 100%. If a person does not answer any question the score was divided by total possible score, the mean of the subscales were averaged to produce a total score ranging from 0 (best) to 100 (worst). Minimum Detectable change was (90 confidence) =13 points. Change less than this considered to be attributable to measurement error.

SPADI Questionnaires was as follows [8]

In assessing severity of pain, patients were asked to circle the number that best describes his/her pain where: 0 = no pain and 10= the worst pain imaginable.

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of his/her neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm	0	1	2	3	4	5	6	7	8	9	10

Patient were asked to circle the number to assess his/her disability where 0=no difficulty and 10=so difficult it requires help.

Washing his/her hair?	0	1	2	3	4	5	6	7	8	9	10
Washing his/her back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on his/her pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 10 pounds (4.5 kilograms)	0	1	2	3	4	5	6	7	8	9	10
Removing something from his/her back pocket?	0	1	2	3	4	5	6	7	8	9	10

The patients were randomly divided in two groups of 25 each by a computer generated randomized number table. Patients of first group (Group – 1) were administered suprascapular nerve block using the ultrasound guided technique and that of second (Group – 2) were administered glenohumeral intraarticular injection using the ultrasound guided technique through anterior approach. In both groups 6 ml of drug (5ml of 0.25% bupivacaine and 1ml (40 mg) methylprednisolone) was used. Parameters like pain, range of motion, disability and complications were recorded to determine the efficacy of suprascapular nerve block and intraarticular injection. Range of motion was recorded at the following intervals: before the procedure, thirty minutes, one week and four weeks after the procedure while SPADI was recorded before the procedure, and one week and four weeks after the block. If the VAS score is ≥ 4 , at any time interval during study, procedure was repeated with the same technique as used previously. Side effects and complications, if any were recorded. Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0. Continuous variables were presented as mean \pm SD or median if the data is unevenly distributed.

Categorical variables were expressed as frequencies and percentages. The comparison of normally distributed continuous variables between the groups was performed using the student's t-test and within the group using paired t-test. Nominal categorical data between the groups was compared using Chi-square test or Fisher's exact test as appropriate. Non-normal distribution continuous variables were compared using Mann Whitney U test. For all statistical tests, a $p < 0.05$ was taken to indicate a statistically significant difference.

3. Results

In this study 50 patients of either sex, between 40-70 yrs of age, with chronic shoulder pain were enrolled. The age of patients varied from 40 to 70 years. The youngest patient was of 40 years and the oldest of 70 years. Mean age in the two groups i.e. Group I and in Group II was 55.96 ± 7.49 years and 59.24 ± 10.62 years respectively. In both groups no. of male and female patients were equal. The median duration of pain in Group I was 6 month and in Group II was 5 month; which was comparable ($p > 0.05$) by using Mann Whitney test. The baseline value of visual analogue scale (VAS) in Group I was 6.12 ± 1.09 and in Group II was 6.44 ± 1.36 . The value of VAS at

baseline in both the groups was comparable ($p > 0.05$). In Group I, the VAS decreased from baseline value of 6.12 ± 1.09 to 3.32 ± 1.18 immediately after the block, further decreased to 1.88 ± 0.88 at one week and to 1.56 ± 0.71 at four weeks. In Group II, the VAS decreased from baseline value of 6.44 ± 1.36 to 5.04 ± 0.98 immediately after the block, further decreased to 2.56 ± 1.08 at one week and to 2.20 ± 1.16 at four weeks. Using student t-test, when the VAS score of the two groups was compared with each other at all three time intervals i.e. immediately after block, one week and four week follow up, there was significant improvement ($p < 0.05$) in Group I as compared to Group II.

All range of movement like flexion, extension, abduction, internal-rotation, and external-rotation, were measured and recorded in both the groups using a goniometer before the procedure, immediately after, 1 week after and 4 weeks after the procedure.

Flexion

In the Group I, mean value of flexion improved from baseline value of 90.00 ± 21.41 to $115.60^\circ \pm 14.67$ immediately after, to $125.20^\circ \pm 7.29$ at one week and to $126.60^\circ \pm 6.41$ at 4 weeks after the SSNB. In Group II flexion improved from baseline value of $79.60^\circ \pm 18.76$, to $87.80^\circ \pm 18.03$ immediately after, to $110.80^\circ \pm 13.90$ at one week and to $114.96^\circ \pm 12.64$ at 4 weeks after the intraarticular injection. The baseline value of flexion in both the groups was comparable. The improvement of flexion in both groups when compared with baseline value of same group. When the two groups were compared with each other using student - t test, there was significant improvement ($p < 0.05$) in Group I as compared to Group II at all times after the block.

Abduction

The baseline range of abduction in Groups I and II was $74.80^\circ \pm 15.91$ and $67.80^\circ \pm 21.22$ respectively which was statistically comparable. In the Group I, mean value of abduction improved to $110.0^\circ \pm 24.28$ immediately after, to $137.80^\circ \pm 23.05$ at one week and to $145^\circ \pm 20.92$ at 4 weeks after the SSNB. In Group II abduction improved to $79.80^\circ \pm 18.29$ immediately after, to $118.00^\circ \pm 24.32$ at one week and to $125.80^\circ \pm 23.36$ at 4 weeks after the intraarticular injection. The improvement of abduction in both groups was statistically significant when compared with baseline value of same group. When the two groups were compared, there was significant improvement in Group I as compared to Group II at all times after the block.

Internal-rotation

In the Group I, mean value of internal rotation improved from baseline value $36.80^\circ \pm 9.12$, to $47.28^\circ \pm 7.64$ immediately after, to $59.72^\circ \pm 9.56$ at one week and to $62.80^\circ \pm 10.35$ at 4 weeks after the SSNB. In Group II internal rotation improved from baseline value of $35.00^\circ \pm 7.36$, to $37.80^\circ \pm 8.30$ immediately after, to $53.60^\circ \pm 7.71$ at one week and to $56.92^\circ \pm 7.36$ at 4 weeks after the intraarticular injection. The improvement of internal rotation in both groups, was statistically significant when compared with baseline value of same group. When the two groups were compared, there was significant improvement in Group I as compared to Group II ($p < 0.05$) at all times after the block.

External rotation

In the Group I, mean value of external rotation improved from baseline value of $43.60^\circ \pm 11.32$, to

53.52⁰ ± 11.24 immediately after, to 60.60⁰ ± 10.79 at one week and to 63.28⁰ ± 8.93 at four weeks after the SSNB. In Group II external rotation improved from base value of 40.48⁰ ± 7.38 to 45.60⁰ ± 6.51 immediately after, to 58.12⁰ ± 5.81 at one week and to 59.92⁰ ± 5.08 at four weeks after the intraarticular injection. The improvement of abduction in both groups was statistically significant when compared with baseline value of same group. There was significant improvement in range of external rotation in Group I as compared to Group II just after the block, whereas improvement in both the groups was comparable (p>0.05) at one week and four week.

Extension

In the Group I, mean value of extension improved from baseline value of 32.48⁰ ± 5.00, to 40.44⁰ ± 4.02 immediately after, to 43.04⁰ ± 3.80 at one week and to 42.96⁰ ± 4.12 at four weeks after the SSNB. In Group II extension improved from baseline value of 31.60⁰ ± 5.35, to 33.68⁰ ± 6.24 immediately after, to 42.24⁰ ± 4.94 at one week and to 43.04⁰ ± 4.48 at four weeks after the intraarticular injection. The improvement of abduction in both groups was statistically significant when compared with baseline value of same group. There was significant (p<0.05) improvement in range of extension in Group I as compared to Group II immediately just after the block, whereas improvement in both the groups was comparable (p>0.05) at one week and four weeks after the block.

SPADI pain score

Mean pain score before the procedure in Group I was 65.60 ± 11.34 and in the Group II was 65.07 ± 13.47. The baseline group of both groups were comparable.

The SPADI score in Group I and Group II improved to 21.28 ± 11.47 and 29.92 ± 12.77 respectively at one week and to 14.40 ± 11.76 and 24.88 ± 15.92 respectively at four weeks. There was significant improvement in the pain score at one week and four week in both the groups when compared with base line value of same group. When compared with each other, there was significant (p<0.05) improvement in the pain score in Group I as compared to Group II (student t-test) both at one week and four weeks.

SPADI disability score

Mean disability score before the procedure in Group I was 65.45 ± 10.13 and in the Group II was 61.70 ± 12.92 and this was statistically comparable. The SPADI disability score in Group I and group II, at one week improved to 19.38 ± 12.67 and 27.91 ± 13.50 respectively and at four weeks to 13.07 ± 11.33 and 20.45 ± 13.28 respectively. There was significant improvement in the disability score at one week and four weeks in both the groups when compared with baseline value of same group. When compared with each other, there was significant improvement in the disability score at one week and four weeks in Group I as compared to Group II.

Total SPADI score

Mean SPADI score before the procedure in Group I was 65.94 ± 9.72 and in the Group II was 62.58 ± 13.35, with no significant (p>0.05) difference in the baseline value between the two groups. The SPADI score in Group I and II at 1 week improved to 20.37 ± 11.80 and 28.68 ± 13.04 respectively and at four weeks to 13.63 ± 11.32 and 22.15 ± 14.07 respectively. There was significant improvement in the total SPADI score at one week and at four weeks

in both groups when compared with baseline value of same group. When compared with each other, there was significant improvement in the total SPADI score at one week and 4 weeks in Group I as

compared to Group II. One Patient of Group I and three patients of Group II required repeat block. No complications were observed in either group.

VAS	Group I (n=25)		Group II (n=25)		p Value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
Before Procedure	6.12 ± 1.09	05-Sep	6.44 ± 1.36	04-Aug	0.363
After Procedure (30 Min)	3.32 ± 1.18*	02-Jul	5.04 ± 0.98*	03-Jun	<0.001
At 1 Week	1.88 ± 0.88*	01-Apr	2.56 ± 1.08*	01-Jun	0.019
At 4 Weeks	1.56 ± 0.71*	01-Mar	2.20 ± 1.16*	01-Jun	0.022

Table 1: Pain (VAS) Score

Pain Scale	Group I (n=25)		Group II (n=25)		p Value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
Before Procedure	65.60 ± 11.34	42 - 88	63.68 ± 13.72	40 - 88	0.592
At 1 Week	21.28 ± 11.47*	Apr-46	29.92 ± 12.77*	Aug-58	0.015
At 4 Weeks	14.40 ± 11.76*	Apr-42	24.88 ± 15.92*	Aug-66	0.011

Table 2: SPADI Pain Score

Disability Scale	Group I (n=25)		Group II (n=25)		p Value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
Before Procedure	65.45 ± 10.13	43.85 - 86.25	61.70 ± 12.92	40.00 - 82.5	0.259
At 1 Week	19.38 ± 12.67*	Mar-45	27.91 ± 13.50*	Sep-61	0.025
At 4 Weeks	13.07 ± 11.33*	1.30 - 38.80	20.45 ± 13.28*	May-60	0.04

Table 3: SPADI Disability Score

SPADI	Group I (n=25)		Group II (n=25)		p Value
	Mean ± SD	Min - Max	Mean ± SD	Min - Max	
Before Procedure	65.94 ± 9.72	47.69 - 85.39	62.58 ± 13.35	40 - 68.15	0.315
At 1 Week	20.37 ± 11.80*	3.08 - 45.38	28.68 ± 13.04*	8.46 - 60.00	0.022
At 4 Weeks	13.63 ± 11.32*	2.31 - 40	22.15 ± 14.07*	6.15 - 59.23	0.022

Table 4: Total SPADI Score

4. Discussion

Shoulder pain is a frequent complaint among elderly patients, which leads to a great functional disability and decrease in their quality of life. In many cases, it is difficult to treat as it responds poorly to pharmacological and physical therapies leading to progressive limitation of movement ultimately resulting in adhesive capsulitis. For this reason, it is important to consider interventional options such as suprascapular nerve block, glenohumeral injection, subacromial injection when conservative therapy fails. The complications under ultrasonographic guidance are less as compared to the anatomical landmark guided technique. Fifty patients of either sex, between 40-70 yrs of age suffering from chronic shoulder pain (VAS \geq 4) of duration more than three months were included in study. The patients in Group I were administered SSNB while in Group II patients were administered glenohumeral intraarticular injection using ultrasound guidance. Toit et al [9] found that anterior approach is quicker, easier to perform, more accurate, and better tolerated by patients than the posterior approach. So we used anterior approach. The patient's demographics and duration of symptoms were comparable in both groups. The pain was recorded using Visual Analogue Scale (VAS) score. Both technique produce significant reduction in VAS score when compared with their baseline value. However patients who received suprascapular nerve block had greater reduction of VAS as compared to intraarticular injection. Our results are similar to the study by Jones et al [10], who compared effectiveness of suprascapular nerve block with a course of intra articular injections and found significant

improvement in pain scores after the suprascapular nerve block as compared to a series of intraarticular injections. Evren et al. [11] compared efficacy of intraarticular shoulder injection and suprascapular nerve block in patients with hemiplegic shoulder pain. They concluded that neither injection technique is superior to the other. The above study was conducted in patients with chronic shoulder pain following stroke in which neuropathic pain may be a contributing factor and they had used blind technique for both the procedures. This could have led to the difference of results between their study and ours. In our study, the baseline values of all individual shoulder movements were comparable in both the groups. There was overall significant improvement in all range of shoulder movements in both the groups from the baseline value immediately after, at 1 week and at 4 weeks after the procedure. The improvement in Group I (suprascapular nerve block) was significantly better ($p < 0.05$) as compared to Group II (intraarticular injection) at all time during follow up for flexion, abduction, and internal rotation. The improvement in external rotation and extension was more in suprascapular nerve group as compared to intraarticular group but did not reach upto statistically significant level. Hence suprascapular nerve block was more effective than intraarticular injection in improving the range of movement. Our results were in accordance to Abdelshafi et al. [12], who observed significant increase in active shoulder movements after 12 weeks i.e. abduction, flexion, external rotation and internal rotation in group using suprascapular nerve block as compared to intraarticular injection. Ozkan et al. [13] compared the effect of suprascapular nerve block in patients with frozen shoulder and diabetes mellitus

unresponsive to intraarticular steroid injections. They found significant improvement in pain scores and range of motion after suprascapular nerve block. They concluded that effective results after suprascapular nerve block were obtained for the treatment of refractory frozen shoulder pain not responding to intraarticular steroid injections

In our study we assessed the improvement in shoulder function and disability after administration of block using the SPADI (Shoulder pain and disability index). Both technique produce significant reduction in total SPADI score when compare with their base line value; so both are effective for treatment of chronic shoulder pain. However patients who received suprascapular nerve block had greater reduction in total SPADI score when two groups were compared with each other. Similarly Abdelshafi et al [12] in their study, in rheumatoid arthritis patients reported significant improvement in SPADI from baseline value of 82.5 ± 10.4 to 50.7 ± 11.0 after ultrasound guided SSNB as compare to baseline value of 78.7 ± 15.2 to 59 ± 11.7 after intraarticular injection at 12 weeks follow up. In our study, if the patient's VAS score was ≥ 4 at any time during follow up, patients were given the injection with the same technique as used previously. One Patient of Group I and 3 patients of Group II required repeat block. There was satisfactory improvement in all cases after the repeat block. In study conducted by Jones et al [10] requirement of repeat block was more in intraarticular group (four patients required two injections; seven had three injections, out of total 15 patients). Not many patients in our study required repeat joint injection as we used ultrasound guidance for the same. Under ultrasound guidance we can visualize the expansion of joint space when the drug

is being injected, so accuracy of joint injection can be assured. Repeat block should be avoided because of their atrophic effects [14]. So it further reiterate that joint injection should be done under ultrasound guidance. However further studies are required to prove the above hypothesis. However both suprascapular nerve block and intraarticular injection are safe and effective procedures, few complications like pleural puncture, vascular puncture, haematoma at the injection site, septic arthritis, vasovagal attack have been reported in previous studies. But none of the above complications were observed in either group in our study. The limitation of the present study was short term follow up of patients following the block; so long term outcome could not be assessed. Another limitation was that the sample size was small; a large sample size could have helped us to validate our results more emphatically.

5. Conclusion

Both suprascapular nerve block and glenohumeral intraarticular injection are safe and effective methods for management of chronic shoulder pain. They decrease shoulder pain, increase range of movement and shoulder functions as assessed by the Shoulder Pain and Disability Index (SPADI). Few repeat blocks were required and no complications were observed in our study. However suprascapular nerve block is superior to intraarticular injection with regard to improvement of all these parameters i.e. pain, range of motion, and functional activity. No other study has compared suprascapular nerve block with intraarticular injection using ultrasound guidance for chronic shoulder pain, so more research

is required to compare these two interventional techniques for management of chronic shoulder pain.

References

1. Fernandes MR, Barbosa MA, Sousa Ana LL, et al. Suprascapular nerve block: important procedure in clinical practice. Part II. *Rheumatol* 62 (2012): 96-104.
2. Burbak KM, Steveson JH, Czarnecki GR, et al. Chronic shoulder pain: Part I. Evaluation and diagnosis. *Am Fam Phys* 77 (2008): 453-460.
3. Burbak KM, Steveson JH, Czarnecki GR, et al. Chronic shoulder pain: Part II. Treatment. *Am Fam Phys* 77 (2008): 493-497.
4. Cluff R, Mehio AK, Cohen SP, et al. The technical aspects of epidural steroid injections: a national survey. *Anesth Analg* 95 (2002): 403-408.
5. Wassef MR. Suprascapular nerve block. A new approach for the management of frozen shoulder. *Anaesthesia* 47 (1992): 120-124.
6. Rose PGD, Pasad N, Llyod-Smith R, et al. Effective Reduction of Adhesive Capsulitis Pain with a Suprascapular Nerve block given in a primary care clinic. *UBCMJ* 1 (2009): 11-16.
7. Wertheim HM, Rovenstine EA. Suprascapular nerve block. *Anaesthesiology* 2 (1941): 541-545.
8. Roach KE, Budiman ME, Songsiridej N, et al. Development of a shoulder pain and disability index. *Arthritis Care Res* 14: (1991) 143-149.
9. Toit MN, Rad NDV, Villiers R. Anterior approach v. Posterior approach- ultrasound guided shoulder arthrogram injection. *South Afr J Radiol* 12 (2008): 60-66.
10. Jones DS, Chattopadhyay C. Suprascapular nerve block for the treatment of frozen shoulder in primary care: a randomised trial. *Br J Gen Pract* 11 (1999): 39-41.
11. Yasar E, Vural D, Safaz I, et al. Which treatment approach is better for hemiplegic shoulder pain in stroke patients: intraarticular steroids or suprascapular nerve block? A randomized control trial. *Clinical Rehabilitation* 25 (2011): 60-68.
12. Abdelshafi ME, Yosary M, Elmulla AF, et al. Relief of chronic shoulder study of three approaches. *Middle East J Anesthesiol* 21 (2011): 83-92.
13. Ozkan k, Ozcekic, Sarhar S, et al. Suprascapular nerve block for the treatment of frozen shoulder. *Saudi J Anaesth* 6 (2012): 52-55.
14. Turner SL, Jackson D. Shoulder pain after stroke: a review of the evidence base to inform the development of an integrated care pathway. *Clin Rehabil* 16 (2002): 276-298.



This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC-BY\) license 4.0](https://creativecommons.org/licenses/by/4.0/)