e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2023; 13 (11); 154-158

Original Research Article

Efficacy of Suprascapular Nerve Block Guided by Anatomical Landmarks in Arthroscopic Shoulder Procedures to Alleviate Postoperative Pain

Ravindra Gandhi[1], Duraiya Gulamali[2]

[1]Professor, Department of Anesthesiology, Zydus Medical College and Hospital, Dahod, Gujarat
[2]Assistant Professor, Department of Anesthesiology, Zydus Medical College and Hospital, Dahod, Gujarat

Received: 18-08-2023 / Revised: 21-09-2023 / Accepted: 26-10-2023
Corresponding author: Dr. Duraiya Gulamali
Conflict of interest: Nil

Abstract:

Background and Aim: By enhancing perioperative pain management, regional anaesthesia in shoulder arthroscopy decreases the necessity for analgesics and their well-documented adverse effects. At times, a particular type of anaesthetic block may not be appropriate for the anatomy or comorbidities of a patient or its safe execution may necessitate the expertise of a specially trained anaesthetist. The purpose of this research is to assess the analgesic effectiveness of suprascapular nerve block during shoulder arthroscopic procedures.

Material and Methods: The results of an observational investigation involving sixty patients who underwent arthroscopic surgery. Thirty patients out of sixty had undergone blind suprascapular nerve block; the remaining thirty patients had not been administered block. For both groups, pain scores (NRS), rescue analgesics for breakthrough pain, and total fentanyl consumption were documented.

Results: Of the total number of cases, 51 were rotator cuff repair, 4 were SLAP repair and 5 were bankart repair. There was only a statistically significant difference in the NRS value between the groups in the immediate 0 hours postoperative period (p value > 0.05). At 1, 4, 8, and 12 hours, no statistically significant difference existed between the two groups. The acute pain service's records were consulted to determine the total number of fentanyl doses required over a period of 12 hours. The doses required were greater in the GA-only group than in the GA+SNNB group.

Conclusion: In comparison to patients who solely received IV PCA, the total opioid consumption of patients who received SSNB was not significantly reduced. It is our determination that blind SSNB does not provide an additional benefit in relation to alleviating discomfort during arthroscopic shoulder procedures. Additional research involving a more extensive cohort of patients may, nevertheless, contribute to a deeper understanding of this postoperative analgesic approach.

Keywords: Arthroscopic Shoulder Surgeries, Postoperative Analgesia, Rescue Analgesia, Suprascapular Nerve Block.

Introduction

Chronic shoulder pain is a prevalent ailment, particularly among the elderly, which can result in a decline in quality of life and functional capacity. Shoulder discomfort may arise from the joint itself or from any of the muscles, ligaments, or tendons that surround it. [1,2] Its incidence rate among adults ranges from 15% to 30%.

Analgesics, activity modification, and physiotherapy are the components of the initial treatment for these patients. It is challenging to treat in a number of patients due to its poor response to conservative management, which ultimately results in progressive movement restriction and adhesive capsulitis. When conservative treatment fails, it is therefore critical to consider interventional options like suprascapular nerve block (SSNB). [1-3]

By increasing perioperative pain management, regional anaesthesia is utilised during shoulder arthroscopic procedures, thereby decreasing the need for analgesics and their well-documented adverse effects. [4] Over time, modifications have been made to techniques for managing pain during and after surgery; consequently, regional anaesthesia is now utilized almost universally. Interscalene brachial plexus block (ISB) is the regional technique of preference for shoulder surgery due to its extensive research. [5,6] While it offers superior hemodynamic stability and effective postoperative analgesia, it is correlated with an increased risk of complications including unintended vascular injections, pneumothorax, phrenic nerve dysfunction, and Horner's syndrome. The interscalene block-associated motor blockade may predispose patients to neuropraxia and complicate postoperative neurological evaluation. [7] An innovative nerve block technique, suprascapular nerve block (SSNB) is employed to manage persistent shoulder discomfort. [8-10]

The origins of the Suprascapular nerve (SSN) are the superior trunk of the brachial plexus' C5 and C6 nerve roots. Seventy percent of the shoulder joint is supplied with sensory fibres, including the capsule, superior and posterosuperior regions of the shoulder joint, and, in some cases, the epidermis above. Additionally, the supraspinatus and infraspinatus muscles of the rotator cuff are supplied by it. [11]

When it comes to the treatment of shoulder disorders, SSNBs are effective. The treatment of acute and chronic shoulder discomfort, in addition to the diagnosis of suprascapular neuropathy, has been accomplished with success. [12] Common conditions that cause chronic shoulder discomfort, such as rotator cuff lesions, adhesive capsulitis (frozen shoulder), calcifying tendinitis, shoulder arthritis, rheumatoid arthritis, and stroke sequelae, have been shown to respond positively to SSNB. [13,14]

Numerous alterations have been implemented to the surface landmark technique of SSNB since its initial delineation by Wertheim and Rovenstien in 1941. [15] Dangoisse et al.'s surface landmark technique is the most frequently implemented in SSNB.16 Enhancing the precision of surface landmark methodologies is possible through the implementation of image guidance systems, such as computed tomography (CT), ultrasound, and fluoroscopy. An advantage of ultrasound guidance is that it eliminates radiation exposure for both the patient and personnel. Additionally, this procedure operates in real time, allowing for direct observation of drug infiltration around the recess site and suprascapular nerve (SSN).

The purpose of this research is to assess the analgesic effectiveness of suprascapular nerve block during shoulder arthroscopic procedures.

Material and Methods

A one-year observational study was undertaken at the Tertiary Care Teaching Institute of India for the purpose of this research. The research comprised sixty patients who had undergone arthroscopic shoulder surgeries performed by a single surgeon. Patients who were under the age of 18, over the age of 70, or undergoing open surgical procedures or other concurrent surgical procedures were excluded from the study. Patients were categorised into two distinct categories based on their eligibility for SSNB.

In accordance with the established protocol at our institution, every shoulder operation was performed under general anaesthesia. In determining the anaesthetic management strategy for each individual, the anesthesiologist's preference and the presence of comorbidities were both factors. Selected patients received the SSNB following the operation using the anatomical bony landmark technique. A block was administered in the vicinity of the suprascapular fossa.

The scapular spine was determined to be the injection site, which was located 2 centimetres medial and cranial to the midline of the scapular spine. After introducing the cannula downward to the scapula at an angle of around 45 degrees and approaching the scapular notch, 20ml of 0.25% bupivacaine was injected subsequent to negative blood aspiration. All postoperative patients were administered fentanyl PCA for duration of 12 hours, consisting of a bolus dose of 20 micrograms, a lock-out interval of 20 minutes, and the absence of any background infusion. As a rescue analgesic, 75 mg IV injection of Diclofenac was administered when the NRS score exceeded 4.

From the anaesthetic record, demographic data and surgical characteristics, such as the type of shoulder operation, were extracted. A review and record of the anaesthesia protocol, agents, and analgesics used during induction and maintenance were conducted. From the Acute Pain Services (APS) page, the postoperative pain scores, rescue analgesia for breakthrough pain, and total fentanyl consumption were recorded.

Statistical Analysis

Following the compilation and entry of the recorded data into a spread sheet application (Microsoft Excel 2007), the information was exported to the data editor tab of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). The levels of significance and confidence were established at 5% and 95%, respectively, for every test.

Results

Sixty patients were retrieved throughout the duration of the study for all patients who underwent shoulder surgery with a single surgeon. There were no statistically significant differences observed in age, sex, height, weight, or ASA status between the two groups.

Fifty-one of the total cases required rotator cuff repair, four required SLAP repair, and five required bankart repair. The pre-operative NRS for the GA-only group was 2.32 ± 1.20 at rest and 5.10 ± 1.32 while in motion. The average NRS for the GA+SSNB group was 2.11 ± 1.50 during rest and

5.22 ± 1.60 during movement. The difference between the two groups prior to surgery was not statistically significant. (p>0.05)

The average NRS for the GA-only and GA+SSNB groups is presented in Table 2. There was only a statistically significant difference in the NRS value between the groups in the immediate 0 hours postoperative period (p value > 0.05). As shown in Table 2, there was no statistically significant difference between the two groups at 1, 4, 8, and 12 hours. Over the course of 12 hours, the average amount of fentanyl consumed was 250 mcg in the GA-only group and 230 mcg in the GA+SNNB group. Between the categories, no statistically significant difference was observed.

The acute pain service's records were consulted to determine the total number of fentanyl doses required over a period of 12 hours. The doses required were greater in the GA-only group than in the GA+SNNB group.

Table 1: Patient demographic characteristics

Total	**GA**	**GA + SNNB**
No of patients	30	30
Male /Female	16/14	17/13
Age	52.10 ± 11.40	57.25 ± 12.49
Height	165.1 ± 8.2	166.9 ± 8.7
ASA Status I	11	9
ASA Status II	19	21

Table 2: Mean NRS scores of both the groups

Time (HRS)	**Groups**	**Mean± SD**	**P value**
0	GA+SSNB	5.2 .± 2.20	0.04*
	GA only	6.30 ± 1.80	
1	GA+SSNB	4.8 ±1.8	0.32
	GA only	5.05± 1.32	
4	GA+SSNB	4.3 ±1.7	0.9
	GA only	4.45± 2.47	
8	GA+SSNB	3.6 ±1.6	0.65
	GA only	3.2 ±2.6	
12	GA+SSNB	3.10 ±1.40	0.39
	GA only	2.3 ±0.8	

*** indicate statistically significance at p≤0.05**

Discussion

An straightforward, efficient, and risk-free method for treating persistent shoulder discomfort, SSNB is readily executable in the outpatient setting. ISB has traditionally been employed in shoulder surgeries, whereas SSNB has recently come under investigation due to its putative effectiveness and potential for a decreased risk of complications. [17]

In the current investigation, SSNB was administered to a subset of patients as an adjunctive analgesic. The outcomes of both groups that received IV PCA with fentanyl were compared. The findings of our research indicated that the immediate post-operative mean NRS for the GA-only group was 6.30, while it was 5.09, 4.45, 3.2, and 2.3 at 1, 4, 8, and 12 hours, respectively. In the immediate postoperative period, the mean NRS for the GA+SSNB group was 5.2%; at 1, 4, 8, and 12 hours, it was 4.8%, 4.3%, 3.6%, and 3.10, respectively. These findings contradicted those of Park et al., whose study reported that the average VAS scores in the group that received both PCA and SSNB were 7.2 and 6.6 at 1h and 12h postoperatively, respectively. [18] VAS was examined between the ISB and SSNB groups undergoing arthroscopic shoulder surgeries by Kumara et al. (2016). In contrast, the VAS pain scores for the SSNB group were as follows: 4.1, 3.27, 2.53, 2.43 at 30 minutes, 1 hour, 2 hours, and 4 hours postoperatively. [19] Our research revealed that the NRS for the GA-only and GA+SSNB groups differed substantially only in the immediate postoperative period. At 1, 4, 8, and 12 hours, there was no significant difference in results between the two groups. These results were consistent with those of Lee et al., who found no significant difference in VAS scores between the SSNB and placebo groups at 1, 3, 6, 12, 18, and 24 hours in their study. [20] Singelyn et al. found that the SSNB group had reduced VAS scores of 1.9 and 1.1 during rest at 4 and 24 hours after surgery, respectively. The VAS score for movement was 3.5 twenty-four hours after the procedure. [21]

The SSN is a mixed nerve, comprising motor and sensory fibres; it supplies 70% of the sensory supply to the shoulder joint, with the posterior and superior capsules being its primary targets. It derives from the ventral rami of the nerve origins of the fifth and sixth cervical vertebrae. After emerging from the lateral aspect of the upper trunk of the brachial plexus, it proceeds to the scapular notch along the posterior and lateral trajectory. The supraspinous fossa is entered via the suprascapular fissure, which is situated beneath the superior transverse scapular ligament.

Vein and suprascapular artery traverse this ligament. The nerve establishes direct contact with bone within the supraspinous fossa before exiting it infrascapular fossa, which is laterally located to the spinoglenoid notch. Located in the supraspinous fossa, the superior articular branch supplies the coracoclavicular and subacromial bursa, the glenohumeral joint, and the acromioclavicular and glenohumeral ligaments with sensory information. Additionally, motor branches for the supraspinatus and infraspinatus muscles originate from the SSN. [22-24]

Twelve hours later, the average amount of fentanyl consumed was 250 mcg in the GA-only group and 230 mcg in the GA+SSNB group. Between the categories, no statistically significant difference was observed. In their research, Ovesen et al. (2014) documented the use of supplemental morphine within the initial twenty-four hours following surgery. No statistically significant distinction was observed in the overall morphine intake between the SSNB and control groups. [25] Although patient-controlled analgesia was utilised in Park et al.'s study, the total quantity of fentanyl consumed by the patients was not recorded.

A short-term follow-up of patients who underwent the block constituted a limitation of the present study; consequently, the long-term efficacy of both techniques could not be evaluated. A further constraint was the relatively small sample size; a more substantial sample size would have enabled us to more definitively validate our findings.

Conclusion

The amount of opioids consumed by patients who received SSNB as opposed to those who received only IV PCA did not decrease substantially in the SSNB group. It is our determination that blind SSNB does not provide an additional benefit in relation to alleviating discomfort during arthroscopic shoulder procedures.

Additional research involving a more extensive cohort of patients may, nevertheless, contribute to a deeper understanding of this postoperative analgesic approach.

References

1. Fernandes MR, Barbosa MA, Sousa AL, Ramos GC. Suprascapular nerve block: Important procedure in clinical practice. Part II. Rev Bras Reumatol 2012; 52:616-22.
2. Burbank KM, Stevenson JH, Czarnecki GR, Dorfman J. Chronic shoulder pain: Part I. Evaluation and diagnosis. Am Fam Physician 2008; 77:453-60.
3. Burbank KM, Stevenson JH, Czarnecki GR, Dorfman J. Chronic shoulder pain: Part II. Treatment. Am Fam Physician 2008; 77:493-7.
4. Checcucci G, Allegra A, Bigazzi P, Gianesello L, Ceruso M, Gritti G. A new technique for regional anesthesia for arthroscopic shoulder surgery based on a suprascapular nerve block and an axillary nerve block: an evaluation of the first results. Arthroscopy 2008; 24:689-96.
5. Mahmood A, Auldin M, Sultan A. Barriers for Anaesthetists in performing nerve blocks with ultrasound guidance. Br J Med Pract 2012; 5:11-4.
6. Ardon AE, Prasad A, Mcclain RL, Melton MS, Nielsen KC, Greengrass R. Regional Anesthesia for Ambulatory Anesthesiologists. Anesthesiol Clin. 2019; 37(2):265–87.
7. Borgeat A, Ekatodramis G, Kalberer F, Benz C. Acute and nonacute complications associated with interscalene block and shoulder surgery: a prospective study. Anesthesiology. 2001; 95(4):875–80.
8. Simopoulos TT, Nagda J, Aner MM. Percutaneous radiofrequency lesioning of the suprascapular nerve for the management of chronic shoulder pain: a case series. J Pain Res. 2012; 5:91–7.
9. Fernandes MR, Barbosa MA, Sousa AL, Ramos GC. Suprascapular nerve block: important procedure in clinical practice. Rev Bras Anestesiol. 2012; 62(1):96–104.
10. Ritchie ED, Tong D, Chung F, Norris AM, Miniaci A, Vairavanathan SD. Suprascapular nerve block for postoperative pain relief in arthroscopic shoulder surgery: a new modality? Anesth Analg. 1997; 84(6):1306–12.
11. Fredrickson MJ, Krishnan S, Chen CY. Postoperative analgesia for shoulder surgery: a critical appraisal and review of current techniques. Anaesthesia 2010; 65:608-24.
12. Chan CW, Peng PW. Suprascapular nerve block: A narrative review. Reg Anesth Pain Med 2011; 36:358-73.
13. Di Lorenzo L, Pappagallo M, Gimigliano R, Palmieri E, Saviano E, BelloA, et al. Pain relief in early rehabilitation of rotator cuff tendinitis: Any role for indirect suprascapular nerve block? Eura Medicophys 2006; 42:195-204.
14. Ozkan K, Ozcekic AN, Sarar S, Cift H, Ozkan FU, Unay K. Suprascapular nerve block for the treatment of frozen shoulder. Saudi J Anaesth 2012; 6:52-5.
15. Wertheim HM, Rovenstien EA. Suprascapular nerve block. Anesthesiology 1941; 2:541-5.
16. Dangoisse MJ, Wilson DJ, Glynn CJ. MRI and clinical study of an easy and safe technique of

suprascapular nerve blockade. Acta Anaesthesiol Belg 1994; 45:49-54.
17. Kay J, Memon M, Hu T, Simunovic N, Duong A, Paul J, et al. Suprascapular Nerve Blockade for Postoperative Pain Control After Arthroscopic Shoulder Surgery: A Systematic Review and Meta-analysis. Orthop J Sports Med. 2018; 6(12). doi: 10.1177/ 232 596 711 8815859.
18. Park JY, Bang JY, Oh KS. Blind suprascapular and axillary nerve block for post-operative pain in arthroscopic rotator cuff surgery. Knee surgery, sports traumatology. Knee Surg Sports Traumatol Arthrosc. 2016; 24(12):3877–83.
19. Kumara AB, Gogia AR, Bajaj JK, Agarwal N. Clinical evaluation of post-operative analgesia comparing suprascapular nerve block and interscalene brachial plexus block in patients undergoing shoulder arthroscopic surgery. J Clin Orthop Trauma. 2016; 7(1):34–9.
20. Lee JJ, Yoo YS, Hwang JT, Kim DY, Jeon SJ, Hwang SM, et al. Efficacy of direct arthroscopy-guided suprascapular nerve block after arthroscopic rotator cuff repair: a prospective randomized study. Knee Surg Sports Traumatol Arthrosc. 2015; 23(2):562–6.
21. Singelyn FJ, Lhotel L, Fabre B. Pain relief after arthroscopic shoulder surgery: a comparison of intraarticular analgesia, suprascapular nerve block, and interscalene brachial plexus block. Anesth Analg. 2004; 99(2):589–92.
22. Barber FA. Suprascapular nerve block for shoulder arthroscopy. Arthroscopy 2005; 21:1015.
23. Wassef MR. Suprascapular nerve block. A new approach for the management of frozen shoulder. Anaesthesia 1992; 47:120-4.
24. Vorster W, Lange CP, Briët RJ, Labuschagne BC, du Toit DF, Muller CJ, et al. The sensory branch distribution of the suprascapular nerve: An anatomic study. J Shoulder Elbow Surg 2008; 17:500-2.
25. Ovesen J, Falstie-Jensen T, Christensen C. A comparison of subacromial bursae block, suprascapular nerve block and interscalene brachial plexus block after arthroscopic shoulder surgery. Pain Stud Treat. 2014; 2(03):107.