European Journal of Molecular & Clinical Medicine (EJMCM)
ISSN: 2515-8260 Volume 09, Issue 04, 2022

Original research article

Comparison of Combined Suprascapular and Axillary Nerve Block versus Interscalene Brachial Plexus Block in Shoulder Surgery for Postoperative Analgesia

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Abstract

Introduction: Postoperative pain is severe in Shoulder surgeries. Interscalene brachial plexus block provides effective analgesia but it is associated with many adverse effects. To avoid these, we have compared Combined suprascapular and axillary nerve block versus interscalene brachial plexus block in this study.

Aims & Objective: The primary aim of the study was to compare combined suprascapular and axillary nerve block versus interscalene brachial plexus block for postoperative analgesia in shoulder surgery.

Material & Methods: Total 60 patients of ASA grade I, II &III undergoing shoulder surgery were enrolled in this study. They were randomly divided in to two groups of 30 each using envelope method. Group S received Combined Suprascapular and Axillary nerve block. Group I received Interscalene brachial plexus block. All patients were given General Anaesthesia. Assessment of sensory block, VAS score, duration of analgesia, number of rescue analgesics needed in postoperative period within 24 hours were noted and analyzed using X^2 test.

Results: Duration of effective analgesia in group S (545±30.93) was higher compared to group I (459.33±20.16).Total number of Rescue analgesics required in postoperative period was more in Group I (3.366±0.76) as compared to Group S (2.06±0.25).

Conclusion: Combined Suprascapular and Axillary Nerve block provided prolonged duration of postoperative analgesia as compared to Interscalene Brachial Plexus Block following shoulder surgery.

Keyword: Interscalene brachial plexus block, Combined Suprascapular and Axillary nerve block, Shoulder surgery, Postoperative Analgesia

Introduction

Shoulder surgeries are associated with severe intraoperative and postoperative pain to patients. Hence, it requires adequate analgesia and muscle relaxation for the procedure. Various modalities are available for providing peri-operative analgesia which include Opioids, Non-steroidal anti-inflammatory drugs, Regional anaesthesia.

Regional anaesthesia, especially peripheral nerve blocks have various advantages like Decreased need for postoperative analgesics, Decreased incidence of nausea and vomitting, Shortened recovery time and hospital stay, Early ambulation and discharge.[19]

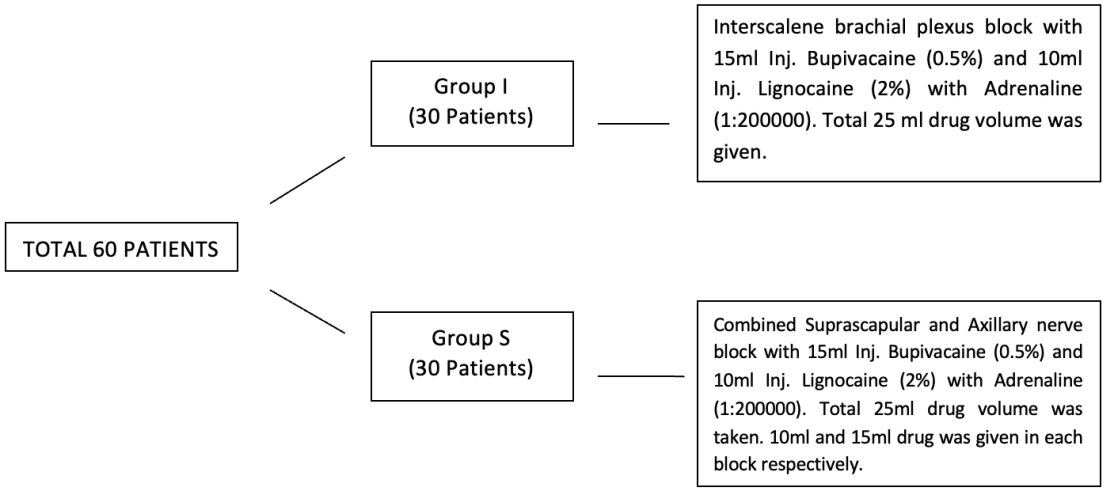
Interscalene Brachial plexus block is one of the most effective analgesic approaches for severe postoperative pain management associated with shoulder surgery. However it has been associated with so many complications. Interscalene Brachial plexus block also produces intense motor block of the shoulder, which may extend to the hand, predisposing the patient to injuries and thus more distal block may be more appropriate and safe.[26]

Interscalene brachial plexus block provides anaesthesia for the shoulder surgery by blocking C5-C6 nerve roots and most of the nerve supply to the shoulder from these two nerve roots are carried by two nerves- namely, the Suprascapular and the Axillary nerves.

Suprascapular nerve supplies sensation for the most of the posterior, medial and superior part of the shoulder joint capsule. It also supplies supraspinatus and infraspinatus muscles of rotator cuff and some branches to the teres minor, the Glenoid, acromion, and the posterior surface of the scapula.

Axillary nerve supplies sensation for the most of the anterior, lateral and inferior parts of the capsule of shoulder joint. It also supplies the deltoid muscle and gives some fibers to teres minor muscle. The axillary nerve also supplies to the skin overlying the deltoid muscle.
So we hypothesize that Combined Suprascapular and Axillary nerve block will provide prolong duration of analgesia and also will reduce rescue analgesic requirement in postoperative period after shoulder surgery.

Materials and Methods
The study was conducted after approval by Institutional Ethics Committee (EC Reg No: ECR/85/Inst/GJ/2013/RR-16). The study was registered with the Clinical Trial Registry-India (CTRI/2020/01/022880). Informed and written consent from all subject was taken before initiation of study procedures. This Randomized, Comparative, Clinical study was performed over 1 year period in which we included American Society of Anesthesiology I,II and III patients posted for Shoulder surgeries.
Those patients who refused to participate or had contraindication to block were excluded from the study.
Randomization was done by using Envelope method.



Interscalene Brachial Plexus Block

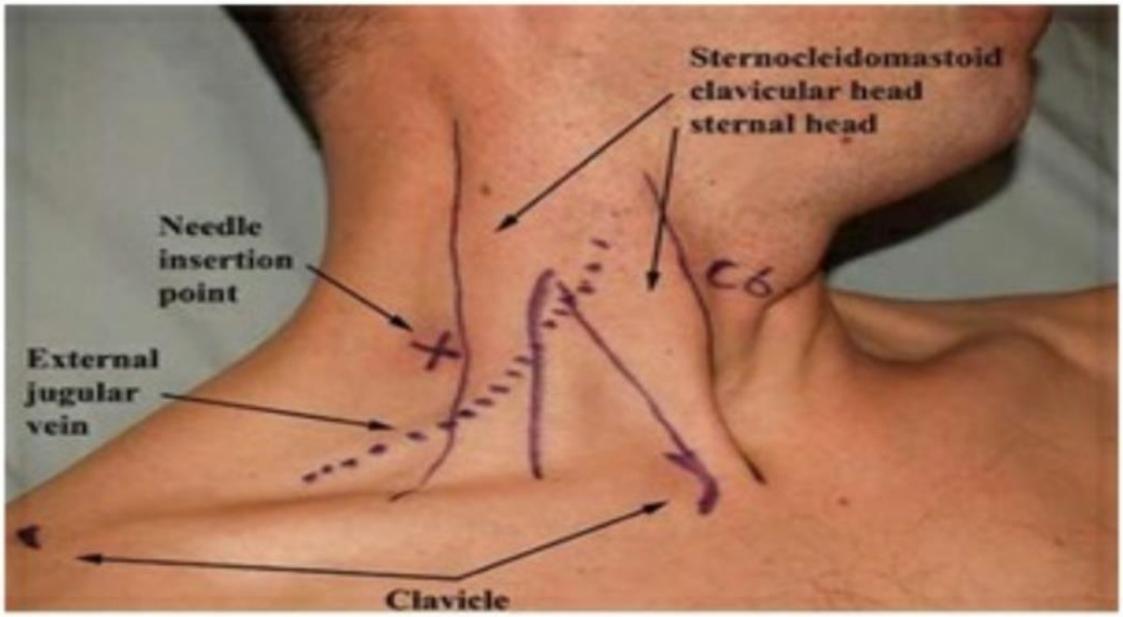
Patient was in supine position with head turned slightly toward the opposite side of the one to be blocked. Skin over the neck was sterilized using betadine-spirit and draping was done with wound towel.

Patient was asked to elevate the head in order to bring the lateral edge of the sternocleidomastoid in to prominence.

Interscalene groove was palpated between anterior and middle scalene muscle at the level of C6 vertebrae which was determined by extending a line directly laterally from the level of lower border of cricoid cartilage.

It was confirmed by palpating transverse process of cervical vertebra and identifying prominent tubercle of sixth transverse process known as Chassaignac's tubercle (carotid tubercle).

50mm insulating needle was attached to nerve locator set at frequency 2.0mA, and was inserted into interscalene groove in a medial, backward and caudal direction. After effective contractions of deltoid, triceps, biceps and lateral pectoral muscles, frequency was decreased up to 0.5mA amplitude of current. After persistent contractions, 25ml volume of drug mixture of 15ml Inj. Bupivacaine (0.5%) and 10ml Inj. Lignocaine (2%) with Adrenaline (1:200000) was given.



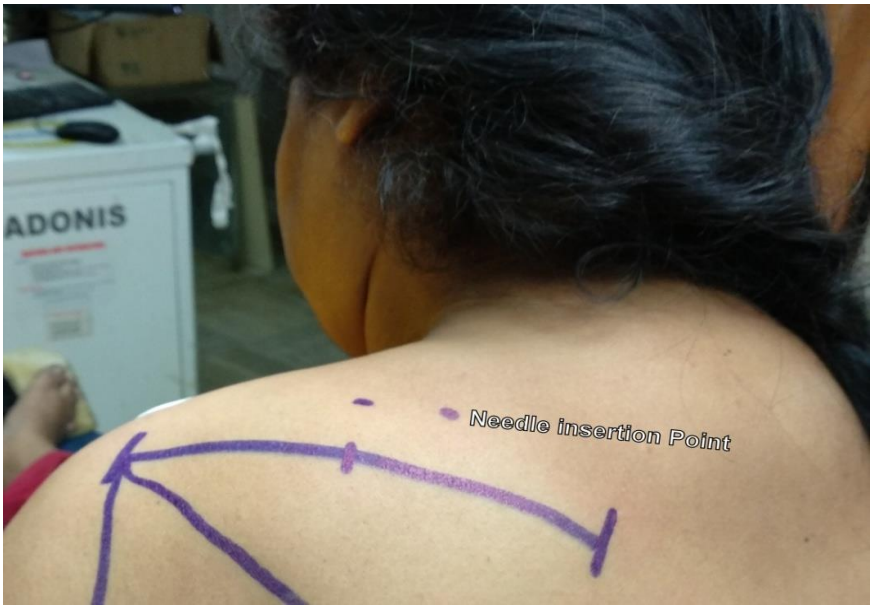
Suprascapular nerve Block:

Patient was in sitting position with arm in full adduction with elbow flexed and resting on anterior thigh. Skin over scapular and posterior arm region was sterilized using betadine-spirit and draping was done with wound towel.

A line connecting the lateral part of acromion and the medial end of the spine of scapula was identified.

The insertion point of needle was located 2cm medial and 2cm cephalad to the midpoint of this line.

100mm insulating needle was attached to nerve locator set at frequency 2.0mA, and was inserted laterally and caudally (45 degree in the coronal plane), after effective contractions of supraspinatus and infraspinatus muscle, the frequency was decreased up to 0.5mA amplitude of current, after persistent contractions, 10ml volume of drug from mixture of total 25ml volume of 15ml Inj. Bupivacaine (0.5%) and 10ml Inj. Lignocaine (2%) with Adrenaline (1:200000) was given.



Axillary Nerve Block (Posterior approach):

Patient was in sitting position with arm in full adduction with elbow flexed at 90^0 and hand resting on knee.

Anterior aspect of acromion process and inferior angle of scapula was identified and a line connecting to both point was drawn. Midpoint of this line was marked as horizontal plane.

The postero-lateral aspect of acromion process was palpated, and from this point a vertical line was traced down directly behind the humerus. This represents vertical plane through which axillary nerve passes laterally at the level of horizontal plane.

The point at which horizontal plane and vertical plane intersect designates needle puncture point.

100mm insulating needle was attached to nerve locator set at frequency 2.0mA, was passed directly anterior from this intersect towards posterior aspect of the humerus and after effective contractions of Deltoid muscle the frequency was decreased up to 0.5mA amplitude of current, after persistent contractions, 15ml volume of drug from mixture of total 25ml volume of 15ml Inj. Bupivacaine (0.5%) and 10ml Inj. Lignocaine (2%) with Adrenaline (1:200000) was given.

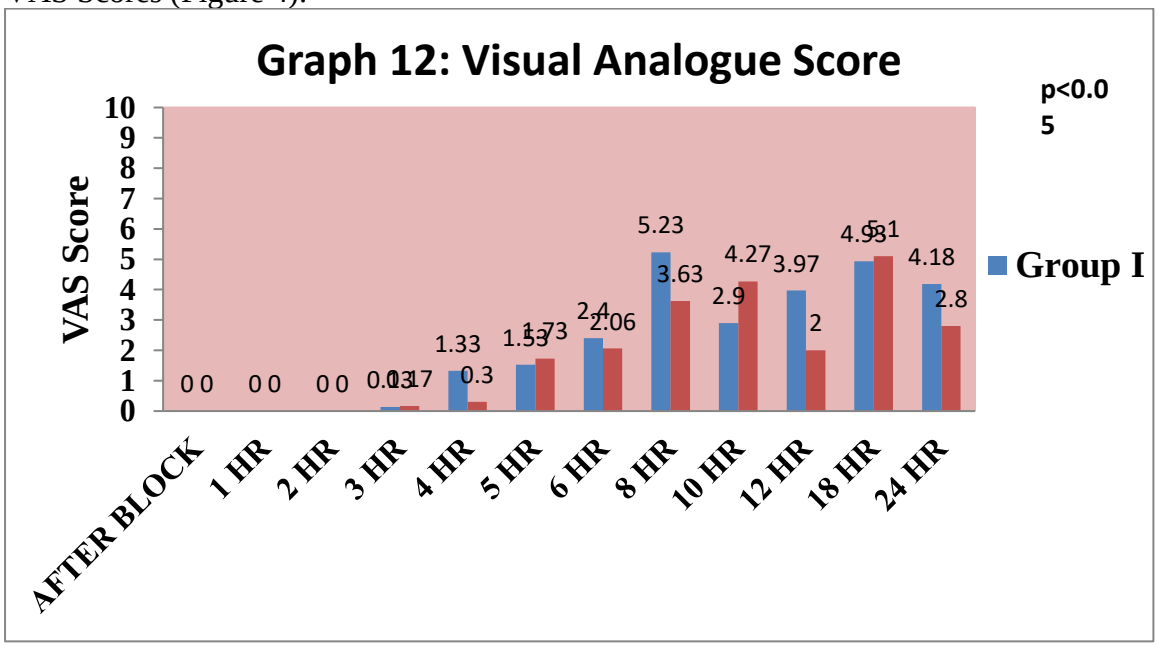
In both groups after giving block, patients were monitored till peak effect of sensory block (loss of touch sensation by pin prick method) achieved and thereafter all the patients were given General Anaesthesia using routine method.

Effect of Sensory block and post-operative analgesia (Visual Analogue Score – VAS) was assessed every 1hr for first 6 hours, every 2 hrs for next 6 hours and then at 18 and 24 hours. Rescue analgesia was given in the form of inj. Tramadol 2 mg/kg intravenously when VAS score was noted as ≥4.
Time when rescue analgesia was needed and the total number of rescue analgesics given over a period of 24 hours postoperatively were compared in both groups.
Results were expressed as Mean±SD. All the qualitative and quantitative data were analysed using chi square test and unpaired t-test respectively. The test for significance was done using Med CalC statistical software. P value of <0.05 was taken as significant.P value of <0.001 was considered as highly significant.

Results
We had total 60 patients in our study 30 patients in each group. 30 patients were randomized to undergo Interscalene Brachial plexus block and remaining 30 patients were given combined Suprascapular and Axillary nerve block.
Demographic data (Table 1) and Vitals (pulse, blood pressure and satuaration) were comparable in both groups.

PARAMETERS	GROUP I	GROUP S	P value
Age in Years (Mean ± SD)	43.86±11.00	42.96±11.76	>0.05
SEX (Male:Female)	19:11	20:10	>0.05
ASA Grade (I:II:III)	9:17:4	11:13:6	

VAS Scores (Figure 4):



VAS score reached a value of 4 or more at the end of 8 hr in group I whereas it took 10 hr for VAS score to reach a value of 4 or more in group S who received combined suprascapular and axillary nerve block.

EFFECTIVE DURATION OF ANALGESIA (figure 5):
Duration of effective post-operative analgesia was defined as time interval from the end of local anaesthetic injection and need for first rescue analgesia.
The total duration of post-operative analgesia was 459.33±20.16 minutes in group I and 545±30.93 minutes in group S.

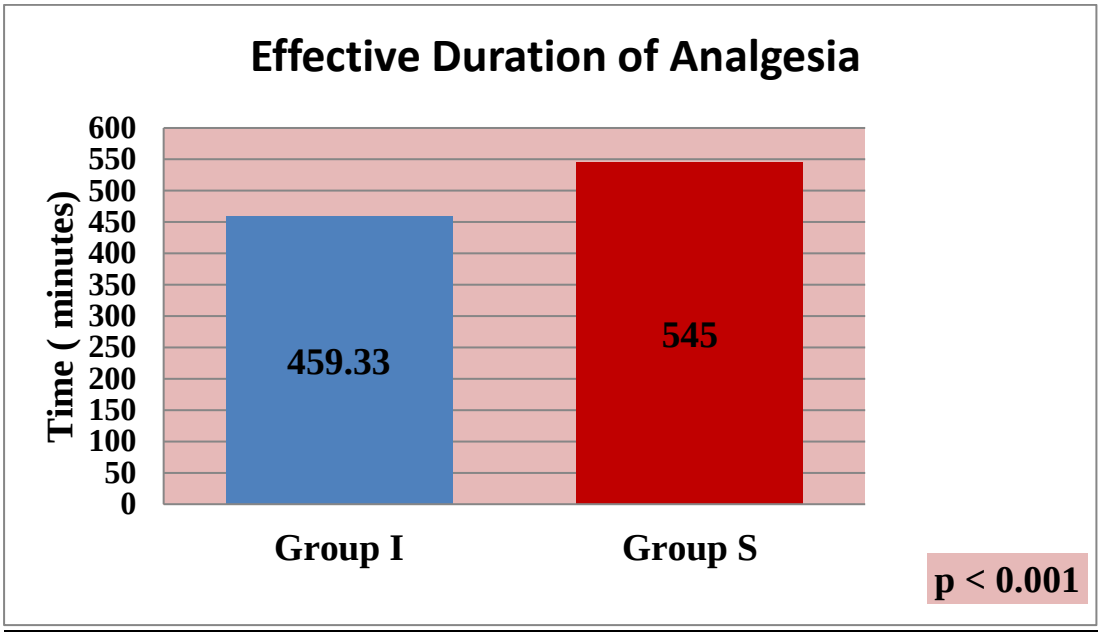


Table 2: NUMBER OF DOSES OF RESCUE ANALGESIC IN FIRST 24 HRS POSTOPERATIVELY

No. Of Doses	Group I	Group S	Intergroup 'p' value
0	0	0	
1	0	0	
2	5 (17%)	28 (94%)	<0.001
3	9 (30%)	2 (6%)	<0.001
4	16 (53%)	0	<0.001

In group I, 17% of patients required 2 doses of rescue analgesics, 30% patients required 3 doses of required analgesics and rest 53% patients required 4 doses of rescue analgesics within 24 hours postoperatively.(Table 2)
Whereas in group S, 94% patients required 2 doses of rescue analgesic and rest 6% required 3 doses of rescue analgesic within 24 hours postoperatively.(Table 2)
None of the patients in Group S experienced any complications where as in group I 4 patients experienced Hoarsness of Voice for which they were counselled.

Discussion
Perioperative pain management is a challenge for the anaesthetists, especially in orthopaedic surgeries as the intensity of pain due to bone trauma far exceeds that of soft tissues and viscera. Pain management in orthopaedics demands high dose and multimodal analgesia.
Interscalene brachial plexus block has been considered one of the most reliable and effective methods for intraoperative and postoperative analgesia during shoulder surgery, however it is associated with significant complications.
Using peripheral nerve stimulator as guidance for the blockade facilitates the direct localization of the neural structure, which allows better local anaesthetic deposition around the roots of the

plexus and the peripheral nerves, thus improving success rate of block performance and reducing complications of each blockade.[4]
Lignocaine and Bupivacaine are both amide local anaesthetics. In the present study we used a combination of both for interscalene brachial plexus block and combined suprascapular and axillary nerve block as it provides early onset of action, Longer duration of block, Better sensory & motor blockade, Decreased dose of individual drug hence reducing incidence of side effects. [27]

Hala E Zanfaly et al (2016) compared shoulder block versus interscalene nerve block for postoperative pain relief after shoulder arthroscopy. They included 75 patients dividing in to three groups of 25 patients in each: GA-only group, GA+ISB, GA+ShB. VAS score, time for first call for analgesia and total analgesic required in 24 hrs postoperatively was recorded. They found VAS significantly less in GA+ISB and GA+ShB groups compared to GA only group ($p < 0.001$). The time to first analgesic request was significantly longer in GA+ISB group [10(9-10hrs)] and GA+ShB group [9(9-10hrs)] compared with GA only group [1hr] ($p<0.001$). Total dose of analgesic consumption was significantly higher in the GA only group [10 (9-10mg)] compared with GA+ISB group [6(5-6mg)] and GA+ShB [6(6-7mg)] ($p<0.001$). Incidence of complications was higher in the GA+ISB group compared with other two groups ($p<0.001$).[26]
Shalini Dhir et al (2016) compared combined suprascapular nerve block and axillary nerve block to interscalene nerve block for analgesia in arthroscopic shoulder surgery. Total 60 patients enrolled in study dividing in to two groups with one received SSAX and other received ISB prior to general anaesthesia. Pain scores, adverse effects were recorded in recovery room, 6hrs, 24 hrs and 7 days after surgery. They found that interscalene block had better mean static pain score in recovery room [ISB 1.80(1.10-2.50)] vs SSAX 5.45(4.40-6.49) ($p<0.001$). At 24 hrs, SSAX had better mean static pain score [ISB 6.35 (5.16-7.54)] vs SSAX 3.92 (2.52-5.31) ($P<0.001$). They found less complications in SSAX group compared to ISB group.[6]
Patricia Falcao Pitambo et al (2012) evaluated selective suprascapular and axillary nerve block in comparison with interscalene block. Total 68 patients were allocated in two groups of 34 each. IG group received 0.335 levobupivacaine 30ml with adrenaline 1:200000. After motor response of suprascapular and axillary nerves, SG group received 15 ml of same substance on each nerve. General anaesthesia then administered. Mean duration of analgesia was 20.4±6.8 hours in IG group as compared to 26.3±7.7 hours in SG group ($p<0.05$). Total dose of rescue medication varied between 3 to 6 mg within 24 hours in both groups. [13]
In our study, we followed patients for 24 hrs and observed that all time intervals VAS score was higher in group I as compared to group S. Duration of effective analgesia was significantly prolonged in group S as compared to group I. It was 459.33±20.16 minutes in group I and 545±30.93 minutes in group S. Doses of Resque analgesic requirement was higher in group I as compared to group S. In group I, 5 patients required 2 dose of analgesic, 9 patients required 3 dose of analgesic and 16 patients required 4 doses of analgesic where as in group S, 28 Patients required 2 dose of analgesic and 2 patient required 3 dose of analgesic.

We observed hoarsness of voice in 4 patients in group I where as no complications observed in group S.

In conclusion, our study proves that Combined Suprascapular and Axillary nerve Block provides prolonged duration of analgesia with less requirement of rescue analgesics postoperatively as compared to Interscalene Brachial Plexus Block in shoulder surgery with less complications.

Financial support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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