

EFFICACY OF ULTRASOUND GUIDED SHOULDER BLOCK (SUPRASCAPULAR AND AXILLARY NERVE) FOR POSTOPERATIVE ANALGESIA IN PATIENTS UNDERGOING ARTHROSCOPIC SHOULDER SURGERY

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Abstract

Background: Shoulder arthroscopy is both diagnostic & surgical procedure. It needs effective analgesia which is done by USG guided shoulder block. **Materials and Methods:** 37 patients taken for arthroscopic shoulder surgeries were included in this study. Patients between age 21-60 years, ASA grade I-II undergoing arthroscopic shoulder surgeries. All the blocks were done using ultrasound equipment (SonoSite M-turbo, 7-13MHz frequency) and observed for 24 hours in PACU. **Result:** Mean age WAS 39.3±11.98 years with 45.9% males & 54.1% females in our study. 43.2% of study patients had ASA I, 56.8% of study patients had ASA II status. Mean HR in patients was 85.62±7.23 beats/min, Mean SBP was 126.14 ± 8.1 mmHg, Mean DBP was 78.51± 4.62 mmHg, Mean SpO₂ was 98.11± 1.26%. Mean postoperative HR at 0 hr, 1hr, 4hr, 6 hr, 12 hr and 24 hr respectively was 84.19±5.85, 87.22±6.93, 85.35±4.96, 84.46±6.52, 83.05±5.70 and 80.51±6.17 beats /minute. Mean postoperative MAP of study patients at 0 hour, 1 hr, 4hr, 6 hr, 12 hr, 24 hr respectively was 96.30±7.00, 99.48±6.37, 98.86±7.18, 98.07±6.65, 97.49±5.85, 95.06±6.68 mmHg. Mean oxygen saturation at 0 hr, 1 hr, 4hr, 6 hr, 12 hr, 24 hr respectively was 97.78±1.03, 98.24±0.72, 98.22±0.78, 98.59±1.25, 98.46±0.73, 98.62±0.86%. Mean VAS score at 0 hr, 1 hr, 4hr, 6hr, 12hr, and 24hr respectively was 0.12±0.31, 2.59±0.61, 1.46±0.99, 2.27±1.28, 2.27±1.28, 3.51±1.43 and 3.32±1.72. 78.4% patient's had excellent, 16.2% had good, 5.4% overall satisfactory results postoperatively. **Conclusion:** Ultrasound guided shoulder block provides adequate postoperative analgesia following arthroscopic surgery with proven advantages in comorbidities.

INTRODUCTION

Shoulder arthroscopy is a both diagnostic and surgical procedure. Although it is considered minimally invasive, it causes both intra-procedural and post-procedural pain which need a strong analgesia thus is a challenge for intervinist. The benefit of adequate analgesia is to decrease the peri-operative morbidity and improve overall patient compliance. Also effective analgesia accelerates recovery from arthroscopic procedure.^[1-4]

Effective analgesia for arthroscopic shoulder surgery can be achieved by general anesthesia and regional anesthesia⁵. Site-specific, efficient, and long-lasting anaesthesia and analgesia are made

possible by regional anaesthesia. It is appropriate for a large number of high-risk patients and can enhance analgesia, lower morbidity and mortality.^[5-7] Peripheral nerve blocks (PNB) can be used as a stand-alone anaesthetic, as a complement to general anaesthesia to give analgesia and muscular relaxation. PNBs are used for postoperative analgesia, and they offer better analgesia and a lower risk of adverse effects than brachial plexus blocks or peripheral nerve catheters.^[8-10] Following adequate analgesia patients early mobility, pain relief and negligible side effects are good indicators of post procedure patient satisfaction.^[9]

Since the size, depth, and position of the nerve can be identified with proper visual image interpretation, ultrasound imaging is a very promising method for

regional anaesthetic. The strength of blocks can be improved by the anesthesiologist administering regional anesthesia with needle attempts by using visualisation of the moving needle and the dissemination of local anaesthetic under ultrasound guidance. However visibility of vital structures like blood vessels and pleura is important to avoid procedural complications. Improved block completion and success, shorter onset, longer block duration, lower dosages, and minimal complications are all pros of US guided blocks versus nerve stimulator guided blocks.^[11-15]

Aims and Objectives

Evaluate the efficacy of USG guided Shoulder block (axillary and suprascapular nerve) for post-procedure analgesia in patients undergoing arthroscopic shoulder surgery.

- Evaluate the safety profile of ultrasound guided shoulder block (axillary and suprascapular nerve).
- Patient satisfaction with pain relief.
- Haemodynamics during the surgery.

MATERIALS AND METHODS

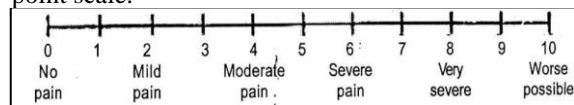
After Approval from the Institutional Ethical Committee and informed consent from patients for participation in the study, 37 patients scheduled to undergo arthroscopic shoulder surgeries were included in this study from August 2018 to July 2020. Patients between 21-60 years, ASA grade I-II undergoing arthroscopic shoulder surgeries (sub acromial decompression, rotator cuff injury repair, recurrent shoulder dislocation, frozen shoulder). Initially before procedure base line monitoring of BP, HR, ECG and SpO₂ were documented as per the ASA guidelines. 18-20 G IV cannula secured in contralateral arm along with oxygen supplementation @4l/min. Premedication 0.03mg/kg of midazolam was administered Intravenously. Standard ASA monitoring was documented during whole procedure. Ultrasound guided blocks were performed by experienced anesthesiologist. All the blocks were done using ultrasound equipment (Sono Site M-turbo, 7-13MHz frequency). Patients were administered 20 ml of 0.5% ropivacaine. Sensory and motor block assessment done every 5 minutes till 30 minutes post injection. Patients were also explained about visual analogue scale (VAS) score. Both sensory and motor examination over upper limb dermatome was done (C4, C5 for shoulder, C6 for thumb, C7 for third finger and C8 for fourth finger). After the blockade, patients received IV propofol @ 2-mg/kg, IV fentanyl @1 mcg/kg, and IV atracurium @0.5 mg/kg as induction agents and patient were put on controlled mode of ventilation. Following this oxygen, N₂O, isoflurane with MAC (0.8-1) and 0.1 mg/kg atracurium boluses for muscle relaxation as maintenance agents. Antiemetic (Ondansetron 4 mg IV) was administered 15 minutes prior to extubation. Neuromuscular blockade reversal was done using IV

neostigmine (0.05mg/kg) and IV glycopyrolate (0.02 mg/kg) and inhalational anesthesia was stopped.

Patients were extubated in the operation theatre and then monitored in PACU for 24 hours. Following observations were made in the postoperative period in the PACU.

1. VAS scores recorded at 0 h, 1h, 4h, 6h, 12h and 24 h post-surgery.
2. Duration for first rescue analgesia (1gm IV Paracetamol) (time from recovery until VAS score is greater than 4).
3. Dose of rescue analgesia administered in 24 hour.
4. Any complication like weakness of upper limb or persistent paresthesia.
5. Post-operative nausea and emesis.
6. Overall patient contentment.

Patient satisfaction scores were assessed on VAS point scale.



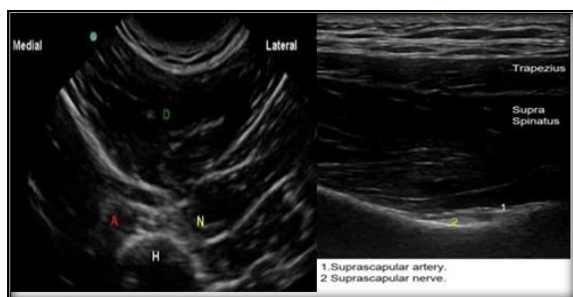
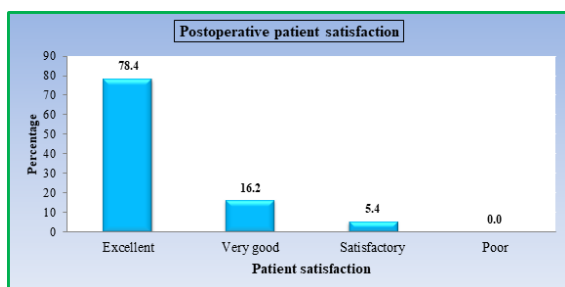
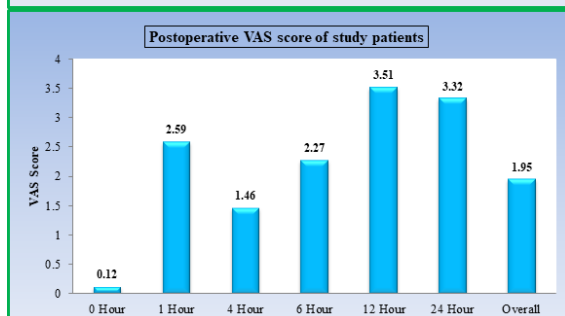
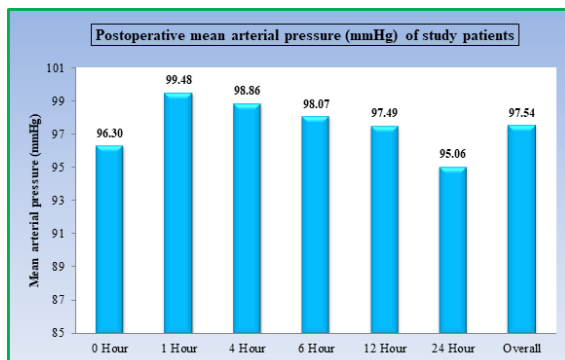
Visual Analogue scale for Pain Assessment

RESULTS

Our study had patients with age ranging from 21-60 years with mean age of 39.3±11.98 years. There were 45.9% males and 54.1% females in our study. 43.2% of study patients had ASA I, 56.8% of study patients had ASA II status. Mean HR in patients were 85.62±7.23 beats/min, Mean SBP was 126.14 ± 8.1 mmHg, Mean DBP was 78.51± 4.62 mmHg, Mean SpO₂ was 98.11± 1.26%

Mean postoperative HR at 0 hr, 1hr, 4hr, 6 hr, 12 hr and 24 hr respectively was 84.19±5.85, 87.22±6.93, 85.35±4.96, 84.46±6.52, 83.05±5.70 and 80.51±6.17 beats /minute. Overall mean heart rate in postoperative period was 84.13± 5.46 beats/ min. Mean SBP at 0 hr, 1 hr, 4hr, 6 hr, 12 hr, 24 hr respectively was 125.43±4.74, 129.92±7.51, 128.70±6.21, 128.92±5.04, 126.68±5.83, 123.92±4.96mmHg. Mean DBP at 0 hour, 1 hour, 4hour, 6 hour, 12 hour, 24 hour was 81.73±9.21, 84.27±7.76, 83.95±8.58, 82.65±8.31, 82.89±7.64, 80.62±9.06mmHg. Mean postoperative MAP of study patients at 0 hour, 1 hr, 4hr, 6 hr, 12 hr, 24 hr respectively was 96.30±7.00, 99.48±6.37, 98.86±7.18, 98.07±6.65, 97.49±5.85, 95.06±6.68 mmHg [Table 1]. Overall mean of MAP was 97.54±5.57 mmHg. Mean oxygen saturation at 0 hr, 1 hr, 4hr, 6 hr, 12 hr, 24 hr respectively was 97.78±1.03, 98.24±0.72, 98.22±0.78, 98.59±1.25, 98.46±0.73, 98.62±0.86%. Overall mean oxygen saturation was 98.32±0.54%. Overall mean respiratory rate in 24hour postoperatively was 14.87±1.06 breaths/minute. Mean VAS score at 0 hr, 1 hr, 4hr, 6hr, 12hr, and 24hr respectively was 0.12±0.31, 2.59±0.61, 1.46±0.99, 2.27±1.28, 2.27±1.28, 3.51±1.43 and 3.32±1.72. Overall mean VAS score was 1.95±0.53 [Table2]. Mean rescue analgesic first dose was at 12.65±5.62 hours.

Postoperative mean analgesic consumption in 24 hour postoperatively was 1.54 ± 0.51 gm. Out of 37 patients 78.4% patient's had excellent, 16.2% had good, 5.4% overall satisfactory results postoperatively. [Table 3]



DISCUSSION

This study was done at Bone & Joints hospital for evaluating the analgesic effects of USG guided Shoulder block in arthroscopic shoulder surgery during post-operative period. Our study, included age group of 20 to 60 years with mean age as 39.3 ± 11.98 years. The maximum no of patients in range 20 and 40 years. 45.9% were males and 54.1% were females. 43.2% of patients had ASA 1 and 56.8% had ASA 2 status. In our study intraoperatively all patients maintained their vitals in normal range. Postoperative

mean heart rate in 24 hours was 84.13 ± 5.46 beats/min. Postoperative mean systolic blood pressure was 127.26 ± 3.64 mmHg, mean diastolic blood pressure was 82.68 ± 7.06 mmHg over 24 hours, mean oxygen saturation was also maintained 98.32 ± 0.54 and mean respiratory rate was 14.87 ± 1.06 breaths/min over 24 hours. Pain was assessed in postoperative period at 0 hr, 1 hr, 4 hr, 6 hr, 12 hr and 24 hr period using visual analogue scale. Mean VAS scores at 0 hr, 1 hr, 4 hr, 6 hr, 12 hr, and 24 hr were 0.12 ± 0.31 , 2.6 ± 0.88 , 1.46 ± 0.99 , 2.27 ± 1.28 , 3.51 ± 1.43 , and 3.32 ± 1.72 respectively. Overall mean VAS score of all the patients in the postoperative period was 1.95 ± 0.53 with range of 1- 3. It showed that in the immediate postoperative period at 1 hour some patients complained of mild pain (VAS 2.6 ± 0.88 ; 1-3) but it gradually decreased and had lesser VAS score at other time intervals.

Our study results were in correlation with the study of Dhir S et al. in 2016,^[16] who compared Suprascapular & axillary nerve block (SSAX) to interscalene block (ISB) for postprocedural analgesia in shoulder surgeries. The findings were that SSAX block group patients had higher mean static pain scores at 1 hour postoperatively (SSAX mean VAS 5.45) but at other time intervals pain decreased and had better mean static pain scores. At 24 hours mean VAS score was 3.92. Also in our study mean VAS score at 24 hour postoperatively was 3.32 ± 1.72 . Increased pain in the early postoperative period in SSAX block group was attributed to irrigating fluid from the arthroscopic procedures which takes upto 12 hours to be absorbed and Capsular over-distension. Our results were also similar to a study conducted by Neuts A et al in 2018,^[17] which found that patients receiving combined Suprascapular and axillary nerve block had higher mean static pain scores in the immediate postoperative period (mean NRS 2.96) which gradually decreased and at 24 hour mean pain NRS score was 3.2 [Figure a] and [Figure b]. They concluded that there was mild pain in patients receiving combined SSAX block in immediate postoperative period but it provides adequate postoperative analgesia at other time intervals after arthroscopic shoulder surgery and also reduced the opioid requirements in the postoperative period. Similar results are also reported by a study of Lee JJ et al in 2014.^[18] They found that mean static pain scores at 1 hour postoperatively were higher (mean VAS 5.1) and had better mean static pain scores at 24 hour postoperatively (mean VAS 2.5).

Our study are also consistent with study by Checcucci et al in 2008,^[19] who found low VAS score with in first 24 hours after shoulder block and over all dose of non-opiate analgesics during the first 24 postoperative hrs was minimal. Price D et al in 2012,^[20] documented that Suprascapular-axillary nerve block has complete shoulder joint analgesia. They also reported that shoulder block has adequate pain relief with less analgesic usage postoperatively. Abdallah FW et al in 2020,^[21] documented that Suprascapular Nerve block provided adequate

postoperative pain control in arthroscopic surgery. In our research Out of 37 patients, 11 patients required rescue analgesia in first 24 hours. Mean time first rescue analgesia was 12.65 hr block. Total Rescue Analgesia consumption in 24hrs was mean 1.54 ± 0.51 gms. Our study results are also supported by study of Pani N et al in 2016,^[22] reported that in Shoulder block group mean VAS score in 24hours postoperative period was 3.16 ± 1.1 hrs, time to first analgesic request 5.8 ± 1.2 hrs and total analgesic consumption in 24 hours 3.0 ± 1.1 gms. Our results match with Zanfaly HE et al,^[23] which showed time to first analgesic request was 9hours (9-10h) and total analgesic consumption in 24hours postoperative is 3gm.

Among 37 patients 78.4% patients had excellent satisfaction, 16.2% had very good satisfaction. Our results match with Checcuciet al,^[19] Pitambo et al,^[24] and Shalini Dhir et al. Zanfaly et al in 2016,^[23] showed Shoulder block has post-procedural pain relief after arthroscopic shoulder surgery and excellent level of patient satisfaction. Our results also match with results obtained by Wiegel M et al in 2017.^[25]

In our study none of the patient developed any block related complications like nerve injury, intravascular injection, haematoma or pneumothorax. Similar findings were also observed in studies of Checcuci et al,^[19] had no complications with shoulder blockade like suprascapular nerve injury, haematoma or pneumothorax. Our study matched with study conducted by Lee JJ et al in 2014.^[18] Our study results are also supported by study of Abdallah F et al in 2020 who suggested that Suprascapular block provides adequate postoperative analgesia after shoulder surgeries and also there were not any block related complications.

CONCLUSION

The results of our study demonstrate that using ultrasound guided shoulder block provides adequate postoperative analgesia following arthroscopic surgery at different time intervals postoperatively. There is decreased analgesic consumption in the postoperative period after shoulder block. Patients with risk of respiratory complications preclude other analgesic modalities like interscalene block, opioids for shoulder surgery may derive immediate benefits from our findings for effective pain control. Motor blockade associated with SSAX nerve block is confined to the rotator cuff muscles and deltoid muscle. The pectoral and latissimus-dorsi are preserved along with those of the upper arm, forearm and hand. So, in addition to providing analgesia it also preserve patient's functional capacity. As far as incorporation of the shoulder block into practice, the impediments should be minimal, as this block is performed in a superficial spot, which facilitates needle and targeted nerve visualization when done under ultrasound imaging. The anatomical zone in

which the SSNB is performed is also relatively far from major vascular and neurologic structures. Both of these factors speak to the technical simplicity and agreeability to practitioners. Our study is safe in patients with high risk for complications as it provide superior analgesic effect in shoulder surgeries, better satisfaction and decreased analgesic requirements.

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