

Interscalene Nerve Block Superior to Multimodal Analgesia for Arthroscopic Shoulder Surgery

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Abstract

In this retrospective study, we identified patients who had undergone outpatient, arthroscopic shoulder surgery utilizing interscalene nerve block, and compared them to those who underwent general anesthesia with multimodal analgesia. We hypothesized that PACU discharge time would be significantly lower, and that pain control would be superior, for patients undergoing ISB with sedation as compared to general anesthesia

with MMA. 64 cases were evaluated. The duration of time spent in PACU was significantly lower in the ISB group, while pain scores were both clinically and statistically significantly lower in the ISB group, and opioid requirements were also significantly lower. Peripheral nerve blockade remains superior to MMA for minimizing recovery time, and control of postoperative pain.

Keywords: Interscalene Nerve Block, Multimodal Analgesia, Arthroscopic Shoulder Surgery, Ambulatory Surgery.

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Introduction

Postoperative pain management is important for ambulatory orthopedic surgery procedures, such as shoulder arthroscopy. Interscalene brachial plexus block (ISB) is well-established as a means of effective pain management in shoulder surgeries, compared to general anesthesia alone. Over two decades ago, studies which compared interscalene block plus sedation for arthroscopic shoulder surgery to standardized general anesthesia found significant advantages in recovery times, pain control, resumption of normal activities and reduction in side effects (1). Despite its efficacy, interscalene block is not without risks or side effects, including transient postoperative neurologic symptoms and diaphragmatic paresis or paralysis (2,3).

Multimodal analgesia (MMA) has emerged as an important element for controlling perioperative pain in recent years. MMA employs a combination of pharmacological agents and techniques to target different pain pathways, aiming to enhance pain control while minimizing opioid consumption and its associated side effects (4). This approach has been found to enhance the quality of recovery and minimize the length of stay in post-anesthesia care units (PACU) (5). Despite the frequent utilization of MMA in conjunction with general anesthesia for various surgical procedures, there are no studies that have compared this approach with ISB, in ambulatory shoulder surgery.

This study addresses this question by comparing the efficacy of ISB with sedation versus general anesthesia combined with MMA in patients undergoing ambulatory shoulder surgery. Specifically, we focused on comparing PACU length of stay, pain scores, and opioid requirements during the recovery period as these outcomes are essential indicators of the effectiveness of postoperative pain management strategies. We hypothesized that ISB with sedation would provide significantly shorter PACU discharge times, and secondarily, lower pain scores, and reduce opioid requirements, reflecting more effective and targeted pain control.

Methods

Study Design

A retrospective cohort study was conducted on patients who underwent outpatient shoulder arthroscopic surgery with either bupivacaine ISB and propofol sedation, or general anesthesia including MMA (without nerve block) between 2020 and 2021. Data was sourced from electronic medical records, and institutional board review approval was secured (PRO20050148).

Study Population

All patients underwent a shoulder surgery between January 1, 2020 and December 31 2021, at a University of Pittsburgh Medical Center ambulatory surgical center, or the UPMC-Montefiore Hospital. The initial cohort was identified by a review of the EMR to identify all patients who had undergone outpatient, arthroscopic shoulder surgery utilizing single-shot interscalene nerve block and propofol sedation, and these cases were compared to a similar group who underwent an arthroscopic shoulder procedure with general anesthesia incorporating at least five elements of MMA consisting of ketamine, acetaminophen, ketorolac, dexamethasone, dexmedetomidine, parenteral opioids and local anesthetic injection at the incisional sites by the surgeon. Pediatric patients, pregnant patients, patients with failed nerve blocks and those with planned hospital admission for complex procedures were excluded from the study. Demographics collected for both groups included age, gender, body mass index, comorbidities, ASA physical status scores, and surgery type.

Outcome Measures

The primary outcome measure was duration of PACU length of stay. Secondary outcome measures included verbal rating scale (VRS) pain score on arrival in PACU, opioid administration in OR and in PACU, and number of unexpected admissions in each group. PACU length of stay was defined as the difference in minutes between entry into and exit out of the PACU. VRS pain scores were rated from 0-10. Opioid administration in PACU and in OR was expressed as oral morphine equivalents (OME)⁶.

Statistical Analysis

Continuous variables were compared with a two-tailed independent t test, while Fisher's exact test was used to compare categorical variables such as ASA scores and type of surgery. Paired Wilcoxon signed-rank test was used to evaluate differences in outcome measures (pain scores, opioids required post-surgery, and PACU duration) between the two study groups.

Results

Study Population

Demographics of the study participants are presented in Table 1. A total of 64 cases were included for comparison, 32 of which received ISB with propofol sedation, and 32 of which received general anesthesia with MMA. There were no significant differences between the groups in terms of age, ASA status, or types of surgery.

Outcomes

The primary and secondary outcomes are presented in Table 2. The primary outcome, the duration of stay in the PACU, was statistically significantly shorter for the ISB group, with a median duration of 71.5 minutes, compared to the MMA group, which had a median duration of 96 minutes. VRS pain scores in the PACU were also significantly lower for the ISB Group. Opioid administration in the OR was significantly lower for the ISB group. Similarly, opioid requirements in the PACU were also significantly lower among the patients who received ISB and sedation.

Discussion

Given the increasing use of MMA in combination with GA for painful orthopedic procedures, this study evaluated whether PNB remains a superior means of providing anesthesia in terms of patient-centered outcomes for ambulatory orthopedic procedures. Specifically, we looked at a variety of different shoulder surgeries conducted on an outpatient basis. We found that not only does PNB result in a significant decrease in PACU duration for patients undergoing PNB, but also reduced pain scores and decreased opioid use in the OR and PACU, as compared to patients undergoing GA with MMA consisting of at least five analgesic medications.

Previous studies have shown that PNB is superior to standardized GA for patients undergoing ambulatory orthopedic procedures. Hadzic, et al, investigated infraclavicular block with propofol infusion versus GA incorporating laryngeal mask airway, propofol induction, Desflurane for maintenance anesthesia and local anesthetic injection by the surgeon in ambulatory hand surgery (7). The authors found that the patients in the nerve block group had fewer adverse side effects, earlier return of basic functions (such as drinking fluids and ambulation) and significant reduction in time spent in the hospital. In a similar study with shoulder arthroscopy, the same authors noted similar benefits, as well as an even larger differential in time spent in the hospital (8). McCartney et al evaluated axillary block for ambulatory hand surgery, compared with general anesthesia, and had many of the same findings (9).

Table 1. Demographic data for Interscalene (ISB) and Multimodal Analgesia (MMA) Groups.

	ISB Group, n, (%)	MMA Group, n, (%)	P-value
Age, years, mean (STD)	54.9 (13.1)	55.1 (23.6)	.91
% Female (n)	31.3% (10)	34.4% (11)	
ASA Physical Status			.29
1	6 (18.8)	2 (6.3)	
2	16 (50)	21 (65.6)	
3	10 (31.3)	9 (28.1)	
Surgical Type			.57
Capsular or Lesion,	22 (68.8)	25 (78.1)	
Rotator Cuff Repair	1 (3.2)	0 (0)	
Subacromial Decompression	9 (28.1)	7 (21.9)	

(ASA, American Society of Anesthesiologists).

Table 2. Primary and Secondary Outcomes.

	Interscalene Block Group, median (IQR)	Multimodal Analgesia Group, median (IQR)	P-value
PACU Duration, minutes	71.5 (50.5-96.25)	96 (81.8-120.3)	0.013
OR Opioids, Oral Morphine Equivalents	0 (0-0)	57 (40-75)	<0.001
PACU Opioids, oral morphine equivalents	0 (0-1.8)	16.4 (5.4-21)	<0.001
PACU VRS Pain Score	0 (0-6.25)	7 (6-8.25)	<0.001

(PACU, post-anesthesia care unit; OR, operating room; VRS, visual rating score)

In the past several years MMA has gained popularity particularly because of its ability to preserve analgesia while limiting opioid use. In a study by McLaughlin et al., the authors noted that MMA improved pain scores, decreased postoperative opioid consumption and shortened hospital stays compared to patients receiving a traditional opioid based pain regimen (10). In addition, MMA helps to reduce adverse effects of opioids and potentially reduces chronic pain (11). Despite these potential benefits of MMA when combined with GA, our study suggests that this modality is not as effective as PNB for control of postoperative pain and efficiency of anesthesia for ambulatory shoulder arthroscopic procedures.

Our study has several limitations. This investigation was retrospective in nature and is therefore subject to all the limitations of retrospective studies, including potential for selection bias and reliance on accurate medical record documentation. There was not a defined analgesia protocol for the two groups, which led to some variations in the analgesic regimen that each patient received. For example, some patients in the PNB group also received ketamine and/or acetaminophen. This reflects realistic practice at our institution, as it is not uncommon to add ketamine or other analgesics to peripheral nerve blocks to potentially enhance analgesia.

Conclusion

MMA in conjunction with GA has become almost universal in the anesthesia community, and appears to offer many benefits to patients. However, this study demonstrates that PNB remains superior to GA for efficiency and pain control in painful orthopedic ambulatory procedures, such as shoulder arthroscopy. A future randomized controlled study, with standardized anesthesia and analgesia plans for each group, will help to substantiate these conclusions.

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