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Chart Review of PACU Outcomes for Patients Who Had Ambulatory Shoulder Surgery with Peripheral Nerve Block (PNB) and General Anesthesia Compared to General Anesthesia (GA)

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Abstract

Introduction: Today, regional anesthetics are frequently used in combination with general anesthesia. The purpose of two different techniques is to attain distinct goals. We believed that the use of PNB with the minimization of GA in the ambulatory setting would result in a decreased opioid requirement and subsequently fewer treatment-related side effects, more awake and pain free patients and shorter PACU stays and earlier discharges when compared with general anesthesia alone. Methods: Prior to the start of this retrospective chart review, IRB approval was obtained. Patient's charts were selected based on the following criteria: The control group had a general anesthetic (GA) and did not have a PNB, and the experimental group (PNB/GA) had a PNB and a general anesthetic. Our primary endpoints were PACU length of stay, pain scores, use of opioids and uses of anti-emetics. Results: We found that patient with blocks used less analgesic in the PACU, 3.97 mg vs. 1.39 mg (morphine equivalents). They also appeared to use less antiemetic drugs: 14/19 (patient s without PNB) vs. 7/18. Additionally, the patients that received a block had a statistically shorter PACU stay 107 min vs. 163 min. Conclusion: Patients that did not receive PNB had a significantly longer PACU stay. Additionally the data suggest that the use of PNB's reduces the use of post-op narcotics, which may be related to the lower use of postoperative antiemetic drugs observed.

Keywords

Ambulatory, Nerve Block, PACU, Length of Stay

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1. Introduction

While ambulatory surgery units are continuing to accommodate more invasive and painful surgeries, the challenge for ambulatory anesthesiologists is to provide anesthesia that achieves home readiness within hours of surgery concurrent with prolonged postoperative analgesia after discharge home. The use of modern, fast-acting anesthetics has facilitated the efficient discharge of an alert outpatient; however, post-operative analgesia may still be insufficient. Anesthesia can be divided into two broad categories: general and regional. The objective of general anesthesia is to induce analgesia, sedation, and amnesia, with simultaneous muscle relaxation and suppression of autonomic reflexes. In comparison to general anesthesia (GA), regional anesthesia techniques, specifically the Peripheral nerve blocks (PNBs), are more site-specific and have many benefits in the ambulatory surgery unit including appropriate surgical anesthesia, decreased pain VAS scores and decreased opioid requirements with prolonged postoperative pain relief, and subsequently fewer treatment-related side effects such as PONV and ultimately expedited discharge. Specifically, among the common upper extremity PNBs, we examine the role of the Interscalene Brachial Plexus Block, Supraclavicular Brachial Plexus Block, Infraclavicular Brachial Plexus Block, Axillary Brachial Plexus Block and the Interscalene Block in the ambulatory surgery setting. The increasingly important role of these upper extremity PNBs in ambulatory surgery anesthesia is evident by a more cognizant and pain free patient with less use of narcotic and narcotic side effects, e.g., nausea and vomiting and shorter PACU times resulting in faster and more efficient ambulation and subsequent discharge.

2. Background

There is an artificial separation of regional and general anesthesia. Today many regional anesthetics are combined with general anesthesia. The purpose of two techniques is to provide for two distinct goals. The objective of general anesthesia (GA) is to induce analgesia, sedation, amnesia, with simultaneous muscle relaxation and suppression of autonomic reflexes, whereas the goal of the regional anesthesia (RA) is to provide for hours of postoperative pain relief. Peripheral nerve blocks (PNBs) enjoy many features of the ideal outpatient anesthetic scenario with an increasingly significant role in ambulatory anesthesia. The minimization of GA in the ambulatory setting is arguably the cardinal feature of PNB's with less demand for opioid requirements and subsequently fewer treatment-related side effects when compared with general anesthesia culminating in more cognizant and pain free patients who are more conveniently discharged. [1] However, in a study examining data from the National Center for Health Statistics, Dexter and Macario [2] noted that regional anesthetics were used in only 8% of ambulatory cases. Regional anesthesia is more site-specific and is usually categorized into three categories based on the location of injection: 1) central neuraxial block is injection of an anesthetic drug into the epidural or more specifically intrathecal space; 2) peripheral nerve block is injection near the nerve or plexus supplying the innervated region; and 3) field block is injection into the adjoining tissues, with subsequent diffusion into the target field. The execution of an upper extremity block requires a thorough knowledge of brachial plexus anatomy. To facilitate the placement and to optimize performance, these blocks are performed using ultrasound guidance with or without the use of a nerve stimulator. The interscalene block is performed at a proximal part of the brachial plexus at the level of the C6 nerve root. Advantages of the interscalene block include less need for analgesic intervention and opioids, and subsequently less nausea and vomiting [3], and if performed without general anesthesia the patient could bypass the PACU stay culminating in faster and more efficient ambulation and subsequent discharge. The supraclavicular block is performed at the trunks of the brachial plexus. The cardinal features of this type of block are its efficiency and reliability especially for use for elbow, forearm, wrist, and hand procedures in the fast paced ambulatory setting [4]. The infraclavicular block is performed at the level of the divisions and cords of the brachial plexus where they envelope the subclavian artery. The common uses for this block are similar to the indications for the supraclavicular and axillary (see below) blocks with its relevance for elbow, forearm, wrist, and hand procedures [5].

3. Methods

This is a retrospective chart review. Patient's charts will be selected based on the following criteria: 1) Their surgery took place in an ambulatory setting and they had shoulder surgery. 2) For the control cases, they did not have a PNB, and 3) The experimental group, had a PNB and a general anesthetic.

Collection of data: From the chart of each patient, the following data will be recorded: Arrival time in the

PACU; Discharge time from the PACU; Type of block; use of opioids; pain scores; use of anti-emetics; patient demographics: age, weight, height and sex; ASA status and co-existing diseases.

We record both the doses and number of doses of morphine or morphine equivalents given to the patient while they are in the PACU. Doses X mg will equal the total dose of morphine used in the PACU. For patients that were given fentanyl the conversion factor that will be used is 10mcg of fentanyl = 1 mg of morphine and for hydromorphone 0.17 mg = 1 mg of morphine. We will also record the amount of morphine (or equivalents) that were given intraoperatively. Nausea and vomiting are a common postoperative complication of anesthesia and surgery. Our standard for treatment of nausea and vomiting is: first choice: 4 mg of ondansetron IV, second choice: 4 mg dexamethasone IV and the third choice: 10 mg Reglan IV. Patients are preoperatively classified with respect to their risk. Low risk patients are typically pretreated with 1 anti-emetic, either at the beginning of the case or approximately 20 minutes before the end the anesthetic. Typical pretreatment is with 4 mg of ondansetron. High risk patients receive 2 or 3 of our standard anti-emetics. We will glean from the charts both the pretreatment and PACU number of treatments for postoperative nausea and vomiting.

Discharge time minus the admission to the PACU time will equal the PACU length of stay. We expect the group with the PNB will have shorter PACU length of stays; therefore, we will use a one-tailed unpaired student t-test to compare the groups where $\alpha < 0.05$ will be considered significant.

4. Results

A total of 95 charts were reviewed and of these charts 37 meet criteria: 19 in the GA and 18 in PNB/GA. There was no significant difference in gender: 39% female vs. 41%, age: 52.9 years vs. 53.8 years, weight 183 lbs. vs. 185 lbs., height 66.8 in. vs. 66.9 in. or ASA status 2.12 vs. 2.1 in GA vs. PNB/GA, respectively (**Table 1**).

Additionally, the intraoperative use of narcotic was not significant: GA was 17.7 mg (morphine equivalents) and the PNB was 16.4 mg.

We were not able to assess one of our primary goals: differences in pain score. The rating system used in the PACU, whose primary function is to assess the patient's readiness for discharge, is a modified Aldrete score. It has only 3 broadly defined pain scores: "2" = a pain score of <5, "1" = 5 - 7 and "0" => 7. We did use the surrogate for level of pain, the use of analgesics in the PACU and found that patient with blocks used significantly less analgesic in the PACU, 3.97 mg vs. 1.39 mg (morphine equivalents). They also used significantly less antiemetic drugs: 14/19 (patients without PNB) vs. 7/18. Additionally, the patients that received a block had statistically shorter PACU stays 107 min vs. 163 min $p < 0.003$.

5. Conclusion

We reviewed 90 charts, looking for patients that did not have a nerve block. The first 50 charts all had nerve blocks and were not eligible for the control group. Of the next 40 charts only 19 were eligible for the control group (GA only: no block) and the 14 were used for the "experimental" (GA/PNB) group. An additional 5 charts were reviewed for the experimental group to have a total of 19 charts in each group (total of 38 charts). It was deemed that too many charts would have to be reviewed to increase the control group to 50 patients. We were not able to

Table 1. Preoperative demographics.

Parameter	Group		
	Control (GA only)	GA/PNB	p-value
Age (Yr)	52.89 ± 11.63	53.83 ± 13.34	0.75[a]
Weight (lb)	182.76 ± 33.06	185.44 ± 38.34	0.81[a]
Height (In)	66.8 ± 3.57	66.9 ± 3.39	0.93[a]
Females	39%	41%	0.554[b]
ASA	2.12 ± 0.33	2.00 ± 0.80	0.77[a]

[a]t-test; [b]A Fisher's Exact Test was used to compare the two groups. GA = general anesthesia; GA/PNB = general anesthesia and a peripheral nerve block.

Table 2. Intraopertive events.

Parameter	Group		
	Control (GA only)	GA/PNB	p-value
PACU Duration (Min)	163 ± 52	107 ± 48	0.003[a,b]
Fentanyl (mcg) Intra-op	17.7 ± 10.5	16.9 ± 14.9	0.86 [a]
Morphine equivalents (mg) post-op	3.97 ± 5.2	1.39 ± 2.08	0.19 [b]
Ondansetron 4 mg	10	4	
Dexamethasone 4 mg	0	1	
Reglan 10 mg	10	4	
% Antiemetic Use	74%	39%	0.049[c]

[a]t-test, 2 tailed with unequal variance; [b]Since the data was skewed we also use a non-parametric test, the Mann-Whitney Test and found identical results; [c]A Fisher's Exact Test was used to compare the two groups.

assess one of our primary goals: differences in pain score. The rating system used in the PACU is a modified Aldrete score. Its primary function is to assess the patient's readiness for discharge. It has only 3 broadly defined scores: 2 = a pain score of <5, 1 = 5 - 7 and 0 => 7. We did use the surrogate for level of pain, the use of analgesics in the PACU, and found that patients with blocks used fewer analgesics in the PACU: 3.97 mg vs. 1.39 mg morphine equivalents (GA vs GA/PNB). Additionally, the patients that received a block had statistically shorter PACU stays (**Table 2**). They also used significantly fewer antiemetics (**Table 2**). The data suggest that the use of PNB reduced the use of postoperative narcotics, which may be related to the decreased use of postoperative antiemetic drugs and the shorter PACU stays.

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