

Prospective Evaluation of the Impact of Chronic Opioid Use on Effectiveness of Brachial Plexus Nerve Block

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INTRODUCTION

Addressing acute pain in opioid-tolerant patients poses challenges in perioperative care. Animal studies suggest that repeated opioid exposure reduces the potency of lidocaine in a dose-dependent and time-dependent manner ¹. Currently, there is limited clinical evidence on the impact of chronic opioid use on the efficacy and duration of local anesthetics administered via peripheral nerve blocks ^{2 3 4}. We investigated whether patients with chronic opioid use undergoing upper extremity surgery with a brachial plexus nerve block experience reduced block effectiveness.

CLINICAL FINDINGS

A total of 46 patients were recruited (23 opioid-dependent and 23 control patients, Table 1). Median (interquartile range) PACU NRS score on arrival was 0 (0, 0) in the controlled group versus 0 (0, 5) in the opioid group (P=0.01). There were statistically significant differences in duration of block between the groups (median block duration: 22 hours for control group versus 14 hours for opioid group, p=0.0035). No statistically significant differences in PACU MMEs, PACU length of stay, and intraoperative opioid/dexmedetomidine/ ketamine use (Table 3). Statistically significant differences in mean VAS scores were found between groups (p=0.0070) and across 3 postoperative days (p=0.0021). Statistically significant differences in mean logarithm postoperative MMEs were found between the groups (p=0.0018). No complications were reported.

MAIN DIAGNOSES / INTERVENTIONS

This prospective, observational, single-center study, which was approved by the Institutional Review Board (IRB, STUDY19010112). Patients undergoing upper extremity surgery requiring a brachial plexus nerve block were recruited. Candidates were defined as those who received opioids daily for one month preoperatively in the opioid group and those who did not receive preoperative opioids for 3 months prior to surgery as the control group. Interscalene or supraclavicular nerve blocks were performed depending on the upper extremity surgery with 0.5% ropivacaine or 0.5% bupivacaine. Upon discharge from the recovery area to home, the patient completed a pain diary recording pain scores and opioid use over the following 72 hours. The primary outcome was a PACU VAS score of more than 2 units higher in chronic opioid patients than those not opioid dependents. Secondary outcomes included opioid/dexmedetomidine/ketamine requirement in the OR, block duration, postoperative opioid requirement, and pain scores for three postoperative days.

FIGURES / IMAGES

Table 1 Demographic Characteristics for Control and Opioid Dependent Groups

Characteristic	Median (IQR) or Frequency (%)		p-value
	Control (n=23)	Opioid Dependent (n=23)	
Age (yrs)	57 (51, 66)	60 (54, 67)	0.3672
Gender (Males)	10 (43)	8 (35)	0.5457^
BMI (UNITS)	28 (25, 36)	34 (29, 39)	0.0322
Pain Score Before Block	1 (0, 6)	5 (4, 8)	0.0100
ASA PS Score			0.3911*
1	2 (9)	0 (0)	
2	9 (39)	12 (52)	
3	12 (52)	11 (48)	

IQR = interquartile range (first quartile, third quartile); Wilcoxon rank sum test; ^Chi-square test; *Fisher's exact test

Table 3 Secondary Outcomes

Secondary Outcome	Median (IQR)		p-value
	Control (n=23)	Opioid Dependent (n=23)	
Ave Block Duration (hrs)	22 (17, 25)	14 (12, 18)	0.0035
PACU Opioids (MMEs)	0 (0, 0)	0 (0, 0)	0.0715
PACU Length of Stay (min)	62 (48, 85)	87 (50, 116)	0.1427
OR Fentanyl	0 (0, 0)	0 (0, 0)	0.3685
OR Dilaudid	0 (0, 0)	0 (0, 0)	0.3388
OR Precedex	8 (0, 16)	0 (0, 20)	0.3093
OR Ketamine	10 (0, 30)	10 (0, 20)	0.8047

Wilcoxon rank sum test

Table 2 PACU VAS on arrival

Primary Outcome	Median (IQR)		p-value
	Control (n=23)	Opioid Dependent (n=23)	
PACU VAS on arrival	0 (0, 0)	0 (0, 5)	0.0101

Wilcoxon rank sum test

OUTCOME / SUMMARY

While median pain scores on arrival in PACU were 0 for each group, difference in distribution of scores was statistically significant, with higher scores in the chronic opioid group., Even though the difference is not meet our pre-determined criteria for clinical significance (difference >2 units). it is possible that the nerve block is still in effect at the moment that the patient arrives at PACU.

The secondary endpoints showed the average block duration was clinically significantly shorter in opioid-dependent patients. Once blocks were resolved, the opioid group had substantially greater pain and opioid utilization, which likely reflects the greater degree of reported pre-operative pain in this group, as well as resistance to opioid analgesic effects.

Managing acute pain in opioid-tolerant patients is a significant concern within the field of perioperative medicine. The limited implementation of guidelines in practical clinical settings could be a contributing factor to the elevated occurrence of poorly managed postoperative pain. Based on this result regarding the efficacy of nerve blocks in opioid-dependent patients, anesthesiologists may consider nerve blocks that are both safe and with greater duration for this patient population in hopes of facilitating a more comfortable postoperative recovery.

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