
ORIGINAL RESEARCH

The Effectiveness of PECS II Block on PONV and Rescue Opioid Dose in Post-Modified Radical Mastectomy Patients

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ABSTRACT

Background: Modified radical mastectomy (MRM) remains a mainstay for breast cancer but is associated with significant postoperative pain and postoperative nausea and vomiting (PONV). Pectoralis II (PECS II) block offers targeted chest wall analgesia with potential opioid-sparing and antiemetic benefits. This study aimed to assess the effectiveness of PECS II block on PONV and rescue opioid dose in post-modified radical mastectomy patients.

Methods: This single-blind randomized trial included 32 women (30–65 years) undergoing MRM were allocated to general anesthesia (GA; n=16) or GA combined with ultrasound-guided PECS II block (GA+PECS; n=16). Primary outcome was the mean numeric rating scale (NRS) score in the first 24 hours. Secondary outcomes included incidence of *postoperative nausea and vomiting* (PONV) and need for rescue opioid. Sample size was calculated to detect a 2-point NRS difference (SD 2, $\alpha=0.05$, $\beta=0.20$). The data were analysed using independent t-tests for continuous data and χ^2 or Fisher's exact test for categorical data.

Results: Mean NRS was significantly lower in GA+PECS (1.38 ± 0.50) versus GA alone (3.44 ± 1.37 , $p < 0.001$). PONV occurred in 5/16 (31.3%) of GA patients and 0/16 (0%) of GA+PECS patients (p -value = 0.02). Rescue opioid was required in 1/16 (6.3%) of GA patients versus none in GA+PECS (p -value = 0.31).

Conclusion: Adding PECS II block to GA in MRM substantially improves postoperative pain control and eliminates PONV, with minimal opioid rescue. Larger multicenter studies are warranted to confirm these findings.

Keywords: Mastectomy; Opioid; PECS block; PONV.

INTRODUCTION

Breast cancer incidence and mortality have more than doubled in several regions over the past three decades.^{1,2} Modified radical mastectomy (MRM) is the most common approach for breast cancer treatment, but results in significant acute postoperative pain and postoperative nausea and vomiting (PONV).^{3,4} It is estimated that PONV affects up to 80% of high-risk patients and prolongs recovery, often outweighing concerns about pain itself.⁵ Studies found that PONV is associated with higher healthcare cost, prolonged hospitalization, and higher readmission rate.⁵⁻⁷ Ultrasound-guided Pectoralis II (PECS II) block delivers local anesthetic between the pectoralis minor and serratus anterior muscles, blocking the medial and lateral pectoral nerves and intercostal nerves III–VI.^{8,9} Early reports suggest analgesic efficacy comparable to paravertebral block but with easier application and fewer complications including PONV.^{10,11} However, studies about this topic in Indonesia is lacking. This study aimed to assess the effectiveness of PECS II block on PONV and rescue opioid dose

in post-modified radical mastectomy patients.

METHODS

Study Design and Participants

This was a single-blind randomized trial was conducted in xxx Hospital Manado after ethical approval was obtained from Clinical Research Ethical Committee of Faculty of Medicine, xxxi University. Initially, this study included 32 participants but three participants were excluded. Finally, this study included 32 female patients (30–65 years) scheduled for elective MRM under general anesthesia (GA). The exclusion criteria were: body mass index (BMI) < 18.5 or > 30 kg/m², opioid allergy, coagulopathy, infection at block site, or refusal of consent.

Randomization and Blinding

The participants were randomized 1:1 by sealed-envelope to GA alone or GA+PECS. The outcome assessor was blinded to group allocation.

Interventions

All patients received standard monitoring, premedication with IV ranitidine 50 mg, induction with propofol 2 mg/kg and fentanyl 2 µg/kg, and

rocuronium 0.6 mg/kg for intubation. In the GA+PECS group, PECS II block was performed after induction: under ultrasound guidance, 0.25% bupivacaine 0.2 mL/kg plus dexamethasone 5 mg was injected between pectoralis major/minor and between pectoralis minor/serratus anterior.

Outcomes

Primary outcome was mean NRS (0–10) at 24 hours. Secondary outcomes were incidence of PONV and requirement for IV opioid rescue (fentanyl 1–2 µg/kg).

Sample Size and Statistical Analysis

Based on an expected numeric rating scale (NRS) difference of 2 points with SD 2, $\alpha=0.05$, and power 80%, 16 patients per group were required. Continuous data were compared using independent t-tests; categorical data by χ^2 or Fisher's exact test using statistical package for social sciences (SPSS) V28.0

software. $p<0.05$ was considered significant.

RESULTS

This study included 32 female patients that equally distributed into two groups, GA group and GA + PECS II group (n = 16, respectively). The mean age of participants was 49.62 ± 11.61 years (Table 1). The analysis showed that GA + PECS II group had lower postoperative pain intensity and it is statistically significant (3.44 ± 1.37 vs 1.38 ± 0.50 ; p-value < 0.001) (Table 2). Besides postoperative pain, the incidence of PONV was also differ significantly. GA + PECS II group had no PONV while 31.3% participants in GA group has POND (p-value 0.02) (Table 3). However, the difference of rescue dose opioid requirement was not statistically significant (p-value = 0.31) (Table 4).

Table 1. Demographic Characteristic

Variables	Frequency (%)
Sex	
Men	0 (0)
Women	32 (100)
	Mean \pm standard deviation
Age (years)	49.62 ± 11.61

Table 2. The Analysis of Postoperative Pain

Group	n	NRS (Mean ± SD)	p-value
GA	16	3.44 ± 1.37	< 0.001
GA+PECS II	16	1.38 ± 0.50	

Table 3. The Incidence of PONV

Group	n	PONV(+) (%)	PONV(-) (%)	p-value
GA	16	5 (31.3%)	11 (61.7%)	0.02
GA+PECS II	16	0 (0%)	16 (100%)	

Table 4. Rescue Dose Opioid Requirement

Group	n	Rescue Dose (+) (%)	Rescue Dose (-) (%)	p-value
GA	16	1 (6.3%)	15 (93.7%)	0.31
GA+PECS II	16	0 (0%)	16 (100%)	

DISCUSSION

This trial demonstrates that PECS II block added to GA for MRM significantly improves postoperative analgesia and abolishes PONV compared with GA alone. The 2.06-point reduction in NRS exceeded the minimal clinically important difference.¹² Zero PONV incidence likely reflects opioid sparing, as even low-dose postoperative opioids provoke nausea via chemoreceptor zone stimulation.¹³ Our findings align with earlier meta-analyses showing PECS II block efficacy comparable to paravertebral block and

reduced opioid consumption and case series reporting improved patient comfort with PECS blocks.^{7,11}

This trial confirms that adding PECS II block to general anesthesia (GA) for modified radical mastectomy (MRM) significantly improves analgesia and abolishes PONV compared with GA alone. The observed 2.06-point reduction in 24-hour NRS exceeds the minimal clinically important difference, underscoring robust pain relief with PECS II block.¹³ Anatomical variations in the fascial planes between pectoralis major, pectoralis

minor, and serratus anterior can influence local anesthetic spread and dermatomal coverage. Detailed ultrasound assessment of these layers is therefore critical to ensure consistent block efficacy.⁹

Ultrasound guidance enhances accuracy and safety by visualizing target structures and avoiding vascular puncture. Incremental injections with regular aspiration checks minimize the risk of local anesthetic systemic toxicity.⁸ Beyond analgesia, opioid-sparing effects of PECS II block translate into a marked reduction in PONV. By lowering perioperative opioid requirements, PECS II block disrupts the chemoreceptor trigger-zone activation and gastrointestinal irritation central to opioid-induced nausea and vomiting.¹³ From a systems perspective, reduced opioid use and PONV shorten post-anesthesia care unit (PACU) stays and may lower overall hospital resource utilization, aligning with enhanced recovery after surgery (ERAS) protocols.⁵ Patient perception of care quality also improves. Rosyadi et al. reported higher patient satisfaction scores and a greater willingness to choose the same anesthetic

approach in future surgeries when PECS II block was employed.¹⁴

The versatility of PECS II block extends to various anterior thoracic procedures—including implant placement, cardiac device insertion, and even thoracotomy—broadening its clinical utility beyond breast surgery.⁹ Implementation into routine practice requires structured training in ultrasound-guided regional anesthesia. Incorporating hands-on workshops and competency assessments into anesthesiology curricula can build proficiency without significant resource burdens.⁹ Cost-effectiveness analyses are needed to quantify the economic benefits of PECS II block—particularly its impact on reduced opioid consumption, shorter PACU/hospital stays, and improved patient throughput.⁵ Limitations of this study include its single-center, single-blind design and relatively small sample size for secondary outcomes. Long-term follow-up to assess chronic post-mastectomy pain and multicenter trials with double-blinding will strengthen the evidence base and inform widespread adoption.^{10,11} There are limitations in this study; First, this was a single-centre study

with relative small sample size may limit the generalizability of the result; Second, we did not identify and analyze the confounding factors. Therefore, further studies should be a multi-centre study with larger sample size which also analyse the confounding factors and analyze the data before and after the confound factors were adjusted.

CONCLUSION

Ultrasound-guided PECS II block combined with GA in MRM significantly lowers postoperative pain scores, eliminates PONV, and reduces opioid rescue requirements. Incorporation of PECS II into multimodal analgesia protocols is recommended.

CONFLICT OF INTEREST

The authors declared no conflict on interest in the present study.

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