Pectoral Nerve Blocks for Breast Cancer Surgery:
A Systematic Review and Meta-analysis

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Introduction

For women, breast cancer is the second most common cancer in the United States, following skin cancers.[1] The American Cancer Society estimates that in 2024 about 310,720 new cases of invasive breast cancer and about 56,500 new cases of ductal carcinoma in situ will be diagnosed in women in the United States.[1] Treatment depends on the subtype of cancer, and how much it spreads, but a large portion of these patients undergo either a unilateral or bilateral mastectomy.

The incidence rate of post-surgical pain severity immediately after breast surgery varies widely, with 28-60% of patients experiencing moderate to severe pain. Inadequate pain management has significant consequences impacting the patient and healthcare system. Poorly controlled postoperative pain can lead to increased morbidity, impaired immune function, and chronic pain.

Purpose

We conducted this systematic review and meta-analysis to further discern the clinical utility of the PECS blocks for breast cancer patients undergoing mastectomy. We aimed to quantify the benefits of the PECS blocks compared to general anesthesia alone (control). Our primary objective was to compare the dynamic and static pain scores for these two interventions. Secondary outcomes for this meta-analysis included intraoperative and postoperative opioid consumption, time to first rescue analgesic, incidence of post-operative nausea and vomiting, and the incidence of chronic pain development.

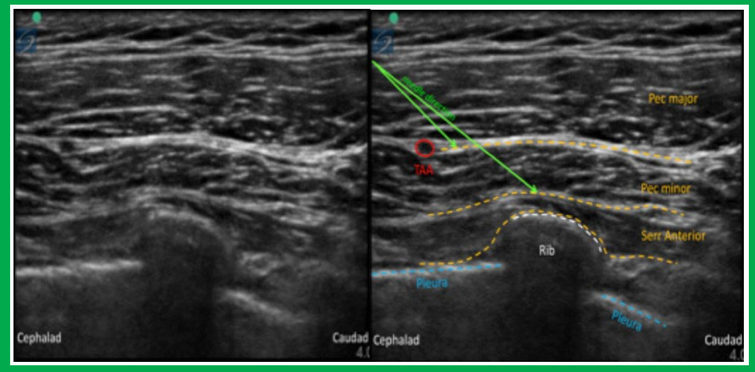
Clinical Significance

The PECS I and II blocks were first described in 2011, and have gained interest in helping decrease perioperative pain, as well as decreasing PONV, need for opioids, and the development of post-mastectomy pain syndrome. These two blocks combined provide anesthesia to the anterolateral chest wall and axilla.

Methodology

This study was deemed exempt from external review by an institutional review board (IRB). Studies were eligible for inclusion in the review if (1) the study was randomized controlled trials (RCTs) with PECS block as the intervention, (2) the study included participants undergoing mastectomy for breast cancer, and (3) the study comparator was placebo or no PECS block. Case studies, case series, case reports, narrative reviews, observational and retrospective studies, editorial, expert opinions, and commentaries were excluded.

These search terms were used alone or combined using appropriate Boolean operators: *breast cancer, breast neoplasm, mastectomy, PECS block, pectoral nerve block, postoperative pain, chronic pain, post-mastectomy pain syndrome, post-mastectomy pain,* and *persistent pain.* The comprehensive search for evidence was conducted using MEDLINE (PubMed), CINAHL, Cochrane Central Register of Controlled Trials, and Google Scholar. Grey literature was also searched for additional relevant articles. The grey literature included clinical trials registries and practice advisory from professional associations. The reference list of the included studies and the *similar article* link in PubMed were searched to identify additional eligible studies.



Parras T, Blanco R. Pecs Blocks. WFSA Resource Library. Published January 31, 2017. Accessed July 7, 2024. https://resources.wfsahq.org/atotw/pecs-blocks/.

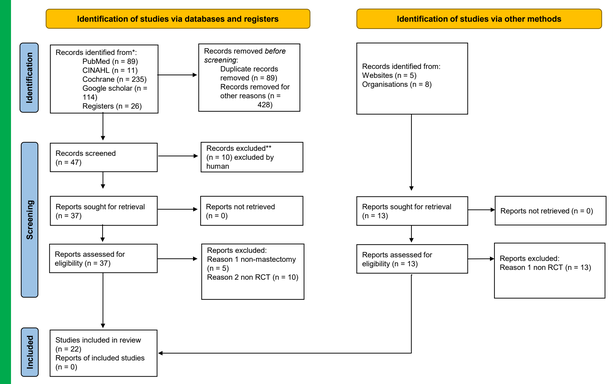
PICO Question

In patients with breast cancer undergoing mastectomy, does the use of pectoralis (PECS) blocks compared to placebo improve postoperative pain and patient outcomes?

Literature Review

Author/Year/ Country	N	Type of Surgery	Blinding	Surgical Anesthetic	PECS Block		Multimodal Analgesia	
					Timing of Block/Type of Block	LA Concentration/ Volume	Intraoperative	Postoperative
Jindal, et al, 2023 India	60	MRM	Double blinded	GETA using nitrous-oxygen-sevoflurane and atracurium	After completion of surgery PECS I PECS II	Bupivacaine 0.25% 10 mL 15 mL	Fentanyl 1 mcg/kg for increased SBP/HR >20% of basal values	NSAIDS and opioids administered upon patient request only for NRS ≥ 3
Alsisi et al, 2021 Egypt	50	MRM, conservative breast surgery	Not addressed by authors	GETA using nitrous-oxygen-sevoflurane and atracurium	After completion of surgery PECS I PECS II	Bupivacaine 0.25% 10 mL 20 mL	Fentanyl 2 mcg/kg Ondansetron 4 mg	Paracetamol 1g IV for VAS >3 Nalbuphine 4mg bolus for continued pain Ondansetron for nausea
Eskandr et al, 2022 Egypt	40	Elective unilateral MRM	No blinding	GETA using isoflurane and atracurium	After induction of anesthesia PECS I PECS II	Bupivacaine 0.25% 10 mL 15 mL	Hartman's solution 5-8 mL/kg/hr Ondansetron 4 mg	Morphine for VAS >30 mm on a 0-100 mm line Maximum morphine dose 30 mg over 48 hr; Ondansetron 0.1 mg/kg for severe nausea or vomiting
Mendonça et al, 2022 Brazil	60	Unilateral mastectomy	Blinded at participant level	GETA using sevoflurane and rocuronium	After induction of anesthesia PECS I PECS II	Ropivacaine 0.5% 10 mL 20mL	Fentanyl 1 mcg/kg for increased SBP/HR >20% of baseline	Dipyrone 1g IV Q 6 hr for VAS ≥ 3 Tramadol if no relief from dipyrone Ondansetron Q 6 hr for nausea
Moon et al, 2022 Korea	30	RNSM with IBR	Blinded to participant, investigator, recovery nurses, and PCA management team	GETA using sevoflurane and rocuronium	After completion of RNSM, prior to IBR PECS I PECS II	Ropivacaine 0.25% 10 mL 20 mL	Remifentanil 0.03 – 0.1 mcg/kg/min, Fentanyl 1 mcg/kg while suturing, Ramosetron 0.3 mg	Fentanyl/ ramosetron PCA with basal infusion rate of 0.1 mL/h (0.002 mcg/kg/h) and bolus dose of 10 mL (0.2 mcg/kg); 15 min lockout Additional rescue dose of fentanyl 50 mcg for sustained NRS score > 4 Paracetamol 1 g IV Mypol Q 8hr for 24 hr Tramadol 50 mg for prolonged NRS score > 4

PRISMA



Results

When evaluating the primary outcome of pain score, the results were based on pain scores during rest (static) and activity (dynamic). The results demonstrated that patients in the PECS block group had lower pain scores during the first 48 hours after surgery in both static and dynamic measurements.

Analysis of the data also demonstrated a significant reduction in intraoperative opioid consumption with PECS block by an average of 5.28 mg of morphine equivalent, reduced postoperative opioid consumption by 9.82 mg, longer time to request analgesic medication by 4.95 hours and a decreased risk of PONV.

Recommendations for Practice Change

The results from this meta-analysis support adding PECS blocks to your anesthetic plan for breast cancer patients undergoing mastectomy. A standardized protocol including type of local anesthetic, concentration, dose, and adjuncts would help further prove the clinical significance of incorporating PECS block into practice.

Research investigating the correlation between using PECS blocks on these patients and the development of chronic pain is needed. This has been difficult in the past studies due to poor follow-up and discrepancies on the classification of chronic pain.

Conclusion

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References available upon request

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