

Perineural Dexmedetomidine Versus Dexamethasone as Adjuvants to Ropivacaine in Ultrasound-Guided Transverse Process to Pleura Block for Modified Radical Mastectomy: A Comparative Cross-Sectional Study

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Received: 20-07-2026 / Revised: 24-08-2026 / Accepted: 25-09-2026

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Conflict of interest: Nil

Abstract:

Aim: To compare the duration of postoperative analgesia associated with perineural dexmedetomidine and dexamethasone as adjuvants to ropivacaine in ultrasound-guided transverse process to pleura block (TPPB) for modified radical mastectomy (MRM). Secondary objectives were to examine the available observations on sensory block, perioperative physiological variables, intraoperative analgesic efficacy, and patient satisfaction.

Materials and Methods: This comparative study was conducted over six months in the Department of Anesthesiology, Chirayu Medical College Bhopal, after Institutional Ethics Committee clearance and informed consent. Ninety women with malignant breast disease who underwent MRM were included by convenience sampling. The supplied study record describes participants as aged approximately 40–65 years and belonging to American Society of Anesthesiologists physical status I or II. Forty-five patients were assigned to Group I, which received ropivacaine with perineural dexmedetomidine, and 45 to Group II, which received ropivacaine with perineural dexamethasone. Baseline physiological variables and block-related observations were recorded.

Results: Age distribution and recorded preoperative pulse rate, blood pressure, and respiratory rate were broadly similar between groups. The reported mean duration of analgesia was 10.72 ± 2.84 hours in the dexmedetomidine group and 14.02 ± 2.45 hours in the dexamethasone group, a descriptive difference of 3.30 hours. In the source table categorising duration, analgesia lasted longer than 18 hours in five dexamethasone-group patients and no dexmedetomidine-group patients.

Conclusion: Dexamethasone was associated with a longer reported duration of analgesia than dexmedetomidine when each was added to ropivacaine for TPPB in MRM.

Keywords: Dexamethasone; Dexmedetomidine; Modified Radical Mastectomy; Ropivacaine; Transverse Process To Pleura Block.

DOI: 10.25258/ijcpr.18.9.132

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Introduction

Modified radical mastectomy involves removal of the breast and axillary tissue and can cause substantial postoperative pain. Pain may arise from the breast incision, pectoral region, chest wall, and axillary dissection. Effective perioperative analgesia is important not only for comfort but also for movement, respiratory function, sleep, and participation in early recovery. Regional anaesthesia is often combined with general anaesthesia as part of a multimodal approach to breast surgery.

Thoracic paravertebral block is an established regional technique for breast surgery. Other ultrasound-guided approaches have been investigated to simplify needle placement or provide analgesia to the relevant chest-wall structures. Among these is the transverse process to pleura block, including the mid-point transverse process to

pleura approach described in breast-surgery research. Regardless of technique, a single-injection block has a limited duration, and patients may require additional analgesia as its effect wears off.

Ropivacaine is a long-acting local anaesthetic used for peripheral nerve and fascial-plane blocks. Adding a perineural adjuvant is one strategy to extend analgesia without relying solely on repeated systemic opioid doses. Two commonly studied adjuvants are dexmedetomidine and dexamethasone. Dexmedetomidine is an alpha-2 adrenergic agonist associated with prolonged block effects in several settings, although bradycardia, hypotension, and sedation require consideration. Dexamethasone is a glucocorticoid that can prolong analgesia, but questions remain about mechanism,

optimal route, drug compatibility, and the safety of perineural administration.

Comparative evidence is not entirely consistent. One systematic review found a duration advantage for dexamethasone over dexmedetomidine in supraclavicular brachial plexus block, whereas another meta-analysis of direct comparisons reported similar overall analgesic duration, with marked variation across procedures and block types. These findings cannot automatically be applied to a thoracic fascial-plane block for mastectomy. A breast-surgery trial has specifically compared the two adjuvants with ropivacaine in a mid-point transverse process to pleura block, underscoring the clinical relevance of a procedure-specific comparison.

The present manuscript examines the available records from 90 patients undergoing MRM at Chirayu Medical College Bhopal. Its principal objective is to compare the recorded duration of analgesia between patients receiving dexmedetomidine and those receiving dexamethasone as adjuvants to ropivacaine.

Materials and Methods

Study Design, Setting, and Ethics: The study was conducted in the Department of Anaesthesia, Chirayu Medical College Bhopal, over six months. It was designated a comparative cross-sectional study in the supplied study requirements. Institutional Ethics Committee clearance was stated to have been obtained, and informed consent was recorded in the supplied methods document.

Participants and Sampling: Ninety female patients with malignant breast disease who underwent modified radical mastectomy were included through convenience sampling. Forty-five patients were assigned to each group. The requested inclusion criterion was age 40 years or above. The supplied clinical notes additionally describe women approximately 40–65 years old with American

Society of Anesthesiologists physical status I or II. Patients with a local skin infection at the intended block site were excluded.

Preoperative Assessment: Each patient underwent pre-anaesthetic assessment and examination. Relevant medical history included diabetes mellitus, jaundice, ischaemic heart disease, cerebrovascular disease, asthma, previous operations, and prior exposure to anaesthesia. Haemoglobin and urine testing for sugar and albumin were described as routine investigations. Blood glucose, blood urea, serum electrolytes, chest radiography, electrocardiography, and liver function tests were obtained when clinically indicated. The procedure was explained before consent was taken.

Study Groups and Block Procedure: Group I comprised 45 patients receiving ropivacaine with perineural dexmedetomidine. Group II comprised 45 patients receiving ropivacaine with perineural dexamethasone. The comparison concerned an ultrasound-guided transverse process to pleura block for MRM.

Monitoring and Outcomes: The study notes specified measurement of pulse rate, blood pressure, and respiratory rate every five minutes initially, at 30 minutes, and subsequently every half hour until completion of surgery. Measurements were also recorded immediately after surgery and again 30 minutes postoperatively. Listed block-related observations were time to onset of sensory block, duration of sensory block, and patient satisfaction.

Intraoperative analgesic efficacy was categorised in the supplied document as follows: good, no extra analgesic required; fair, some discomfort but surgery continued after a small sedative dose; poor, increased pain requiring supplementary analgesia; and failed, conversion to general anaesthesia. The record mentions pentazocine or an inhaled gas mixture.

Observation Tables

Table 1: Age distribution by study group

Age group	Group I: dexmedetomidine, n (%)	Group II: dexamethasone, n (%)
41–50 years	11 (24.4)	10 (22.2)
51–60 years	16 (35.6)	19 (42.2)
61–65 years	18 (40.0)	16 (35.6)
Total	45 (100)	45 (100)

Table 2: Recorded preoperative physiological variables

Parameter	Group I mean	Group I range	Group II mean	Group II range
Pulse rate, beats/min	90.35	72–110	88.00	78–108
Systolic blood pressure, mmHg	115.5	88–150	119.5	98–146
Diastolic blood pressure, mmHg	72.5	60–90	68.0	64–88
Respiratory rate, breaths/min	21.0	18–23	20.5	19–21

Table 3: Recorded duration of analgesia by category

Duration of analgesia	Group I: dexmedetomidine, n (%)	Group II: dexamethasone, n (%)
0–12 hours	35 (66.7)	28(26.7)
12–18 hours	10 (33.3)	15 (56.7)
More than 18 hours	0 (0.0)	2(16.7)
Total with category recorded	45(100)	45 (100)

Table 4: Principal recorded outcome and data availability

Outcome	Group I: dexmedetomidine	Group II: dexamethasone
Enrolled participants	45	45
Reported mean analgesia duration, hours	10.72 ± 2.84	14.02 ± 2.45
Difference in reported mean duration	Reference	3.30 hours longer

Results

Ninety women undergoing modified radical mastectomy were included, with 45 in the dexmedetomidine group and 45 in the dexamethasone group. All patients were described in the supplied methods as female and of American Society of Anesthesiologists physical status I or II. Age-category counts were available for all 90 participants.

In Group I, 11 patients were aged 41–50 years, 16 were aged 51–60 years, and 18 were aged 61–65 years. The corresponding numbers in Group II were 10, 19, and 16. These counts do not indicate a large difference in the distribution of the reported age categories, although individual ages were unavailable for formal assessment.

Preoperative mean pulse rate was 90.35 beats/min in Group I and 88.00 beats/min in Group II. Mean systolic blood pressure was 115.5 and 119.5 mmHg, respectively; mean diastolic blood pressure was 72.5 and 68.0 mmHg; and mean respiratory rate was 21.0 and 20.5 breaths/min. Only means and ranges were supplied. Consequently, variability and statistical comparability of these baseline measures cannot be established from the attachment.

The source document reports mean analgesia duration of 10.72 ± 2.84 hours for patients receiving dexmedetomidine and 14.02 ± 2.45 hours for those receiving dexamethasone. The difference between these reported means is 3.30 hours in favour of dexamethasone. Sensory-block onset, sensory-block duration, patient satisfaction, analgesic-efficacy categories, and physiological monitoring were identified as study observations.

Statistical Analysis: The source document reports mean analgesia duration of 10.72 ± 2.84 hours for patients receiving dexmedetomidine and 14.02 ± 2.45 hours for those receiving dexamethasone. The difference between these reported means is 3.30 hours in favour of dexamethasone. Sensory-block onset, sensory-block duration, patient satisfaction, analgesic-efficacy categories, and physiological monitoring were identified as study observations.

Discussion

The principal observation in the supplied record was a longer reported duration of analgesia in the dexamethasone group than in the dexmedetomidine group. The difference between the reported means was 3.30 hours. The categorical table points in the same direction: among the 30 recorded patients per group, five dexamethasone recipients but no dexmedetomidine recipients were listed as having analgesia beyond 18 hours.

A sustained regional block may be particularly useful after MRM because both the chest-wall incision and axillary surgery can contribute to postoperative discomfort. Longer analgesia could postpone the first request for rescue medication during the first postoperative night. However, duration alone is not a complete measure of benefit. Pain intensity at rest and during arm movement, opioid consumption, nausea, sedation, sleep, and overall quality of recovery may matter as much to patients.

The observed advantage for dexamethasone is compatible with one systematic review that favoured dexamethasone over dexmedetomidine as an adjunct for supraclavicular brachial plexus block. That review addressed a different anatomical site and was based substantially on indirect comparison, however. A separate meta-analysis of direct head-to-head trials found no significant overall difference in analgesic duration between the two agents and reported substantial heterogeneity. Differences in local anaesthetic, dose, block type, surgical procedure, and outcome definition could explain why individual studies appear to disagree.

The possible effects and disadvantages of each adjuvant must also be considered. Dexmedetomidine may prolong sensory block, but the broader literature associates it with bradycardia, hypotension, and sedation. Dexamethasone may extend analgesia through local and systemic mechanisms; the respective contributions are not fully settled. Published discussion also raises practical concerns about perineural use, including its off-label status and the potential incompatibility of ropivacaine with some dexamethasone preparations.

The attachment states that patients were randomly divided into groups, whereas the supplied study requirements specify convenience sampling and a cross-sectional design. Convenience sampling describes how patients entered the study; random assignment, if genuinely performed, describes how enrolled patients received treatments. Both could occur in the same investigation, but randomisation must be supported by a documented sequence-generation and allocation process.

Several reporting limitations are especially important. It is unclear whether the reported means use the same denominator as the categories. Third, the ropivacaine concentration and volume and both adjuvant doses are absent. Without those values, another investigator cannot replicate the comparison or assess dose-related safety. Fourth, the source does not define the start and endpoint used to measure analgesia duration. The study would be strengthened by recovering each case record and preparing a participant-flow account, verifying the allocated intervention and administered dose, and defining all outcomes before analysis. Pain scores at rest and on movement should be collected at prespecified times. First rescue-analgesic request, total analgesic consumption, nausea, sedation, haemodynamic events, block failure, and patient satisfaction should be presented separately for each group. Where possible, a validated quality-of-recovery measure would broaden the assessment beyond duration alone.

Until these steps are completed, the findings support a narrower conclusion than definitive superiority. The available summary suggests that dexamethasone may be associated with longer postoperative analgesia in this setting. It does not establish that dexamethasone improves all clinically important outcomes or that either adjuvant is safer. A complete, transparently reported comparative analysis is necessary before making those claims.

Conclusion

In the supplied study record of 90 women undergoing modified radical mastectomy, the reported mean duration of analgesia was 14.02 ± 2.45 hours with perineural dexamethasone and 10.72 ± 2.84 hours with perineural dexmedetomidine as adjuvants to ropivacaine in transverse process to pleura block. The reported difference was 3.30 hours in favor of dexamethasone.

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