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COMPARATIVE EVALUATION OF THORACIC EPIDURAL ANALGESIA VERSUS INTRAVENOUS DEXMEDETOMIDINE FOR PERIOPERATIVE MANAGEMENT IN MODIFIED RADICAL MASTECTOMY: A PROSPECTIVE RANDOMIZED STUDY

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ABSTRACT

Surgical treatment for breast cancer via Modified Radical Mastectomy (MRM) is often associated with significant acute and chronic postoperative pain. Inadequate pain management contributes to poor clinical outcomes and reduced quality of life. To compare the perioperative analgesic efficacy, hemodynamic stability, and recovery profile of Thoracic Epidural Analgesia (TEA) versus Intravenous (IV) Dexmedetomidine in patients undergoing elective MRM. Sixty ASA Grade II/III patients were randomized into two groups (n=30 each). Group E received TEA (T5-T6 or T9-T10) with 0.25% Ropivacaine loading (10ml) and 0.125% maintenance (5ml/hr). Group D received IV Dexmedetomidine (1mcg/kg loading, 0.5mcg/kg/hr maintenance). The primary outcome was the duration of postoperative analgesia. Secondary outcomes included hemodynamic stability (Heart Rate, MAP), postoperative pain scores (VAS, NRS, VRS), and recovery quality via the Aldrete score. TEA using Ropivacaine provides superior postoperative analgesia, better hemodynamic control, and faster initial recovery compared to IV Dexmedetomidine for MRM.

KEYWORDS: Thoracic Epidural, Dexmedetomidine, Ropivacaine, Mastectomy, Postoperative Pain

Breast cancer is the leading cause of malignancy among women globally. In India, it accounts for approximately 28.2% of all female cancers. Modified Radical Mastectomy (MRM) remains the primary surgical intervention, but it causes significant postoperative pain—affecting up to 40% of patients acutely and 60% chronically.

General Anesthesia (GA) alone does not fully suppress the surgical stress response. Thoracic Epidural Analgesia (TEA) is considered the "gold standard" for thoracic procedures, providing site-specific blockade. Recently, intravenous α2-adrenoceptor agonists like Dexmedetomidine have emerged as systemic alternatives due to their analgesic and sedative properties. This study compares these two modalities to determine the optimal perioperative analgesic strategy for MRM.

MATERIALS AND METHODS

A prospective, comparative clinical study conducted after Institutional Ethical Committee approval and informed consent.

60 elective MRM patients, ASA Grade II/III, aged 18–60 years.

Patients with bleeding diathesis, spinal deformities, or local infections at the spine.

- **Group E (n=30):** Thoracic epidural catheter placed at T5-T6 or T9-T10. Loading: 10ml Ropivacaine 0.25%. Maintenance: 5ml/hr Ropivacaine 0.125%.
- **Group D (n=30):** IV Dexmedetomidine. Loading: 1mcg/kg over 10 minutes. Maintenance: 0.5mcg/kg/hr.

Visual Analogue Scale (VAS), Numeric Rating Scale (NRS), and Verbal Rating Scale (VRS) were used to assess pain intensity. Recovery was assessed using the Aldrete score.

Quantitative data were analyzed using the student's t-test. $P < 0.05$ was considered significant, and $p < 0.001$ was highly significant.

RESULTS

Analgesic Efficacy

The time to first rescue analgesia (VAS ≥ 3) was highly significant, with Group E providing 391.16 minutes of relief compared to 180.10 minutes in Group D ($p < 0.001$). (Table 1)

Pain Scores

VAS, NRS, and VRS scores were consistently and significantly lower in the TEA group (Group E) compared to the IV Dexmedetomidine group (Group D) throughout the first 12 hours postoperatively. (Table 1)

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Hemodynamics

Group D showed a more pronounced initial drop in heart rate and a transient increase in Mean Arterial Pressure (MAP) following the loading dose. In contrast, Group E exhibited a more gradual and stable decline in heart rate and MAP. Group E maintained significantly lower heart rates from 60 minutes onwards through the postoperative phase ($p < 0.001$). (Table 1)

Recovery and Muscle Relaxants

At 15 minutes post-extubation, Group E had a significantly higher mean Aldrete score (9.67 ± 0.48) than Group D (9.00 ± 0.00) ($p < 0.01$). (Table 1)

Table 1

Parameter	Group E (TEA) (n=30)	Group D (IV Dex) (n=30)	p-value	Significance
Analgesic Efficacy				
Time to First Rescue (min)	391.16 ± 50.02	180.10 ± 19.78	< 0.001	Highly Significant
Total Opioid Consumption	Significantly Lower	Higher	< 0.05	Significant
Pain Scores (VAS 0–10)				
VAS at 2 Hours	0.83 ± 0.38	1.90 ± 0.55	< 0.001	Highly Significant
VAS at 6 Hours	1.23 ± 0.43	2.50 ± 0.51	< 0.001	Highly Significant
VAS at 12 Hours	2.10 ± 0.40	2.87 ± 0.57	< 0.01	Significant
Hemodynamic Parameters				
Mean Heart Rate (Intra-op)	Stable (~74–78 bpm)	68–72 bpm (Lower)	< 0.05	Significant
Mean Arterial Pressure (MAP)	82.5 – 88.6 mmHg	86.4 – 94.1 mmHg	< 0.05	Significant
Hemodynamic Pattern	Gradual/Stable Decline	Transient Rise/Fluctuating	-	Clinical Observation
Recovery Profile				
Aldrete Score (at 15 min)	9.67 ± 0.48	9.00 ± 0.00	< 0.01	Significant

DISCUSSION

This study demonstrates that TEA using Ropivacaine is superior to systemic IV Dexmedetomidine for perioperative pain management in MRM. The dense, localized sensory block provided by the epidural,effectively blunts the sympathetic response and nociceptive transmission from T1 to T7, effectively interrupting somatic, neuropathic, and visceral pain signals arising from the chest wall and axilla. Ropivacaine, the long-acting amide local anesthetic used in this study, achieves analgesia through several cellular mechanisms: Ropivacaine is less lipophilic than bupivacaine and has a selective affinity for smaller, pain-transmitting nerve fibers (A2\delta and C fibers) rather than the larger, myelinated A2\beta2 fibers involved in motor function. This allows it to provide effective pain relief with minimal motor blockade, facilitating earlier patient mobilization and higher recovery scores

The findings align with previous literature (Yeh et al., 1999; Doss et al., 2001) that highlights TEA's role in facilitating earlier recovery and providing better dynamic pain relief. The stable hemodynamic profile in the TEA group is attributed to the gradual sympatholytic effect of Ropivacaine, whereas the transient MAP rise in the Dexmedetomidine group is likely due to peripheral α2B-adrenoceptor stimulation. Furthermore, the superior Aldrete scores in Group E suggest that TEA allows for faster emergence, likely due to a reduction in systemic sedative and opioid requirements.

CONCLUSION

Thoracic epidural analgesia with Ropivacaine is more effective than intravenous dexmedetomidine for patients undergoing modified radical mastectomy. It offers a significantly longer duration of analgesia, improved hemodynamic stability, and faster initial postoperative recovery.

REFERENCES

Behera B.K., Puri G.D. and Ghai B., 2008. Patient-controlled epidural analgesia with fentanyl and bupivacaine provides better analgesia than intravenous morphine patient-controlled analgesia for early thoracotomy pain. J. Postgrad Med., **54**(2):86–90.

Doss N.W., Ipe J., Crimi T., Rajpal S., Cohen S., Fogler R.J., Michael R. and Gintautas J., 2001. Continuous Thoracic Epidural Anesthesia with 0.2% Ropivacaine Versus General Anesthesia for Perioperative Management of Modified Radical Mastectomy. Anesth. Analg., **92**(6):1552.

Gurbet A., Basagan-Mogol E., Turker G., Ugun F., Kaya F.N. and Ozcan B., 2006. Intraoperative infusion of dexmedetomidine reduces perioperative analgesic requirements. Can J. Anaesth J. Can Anesth., **53**(7):646–52.

Ilala T.T., Ayano G.T., Kedir Y.A. and Mamo S.T., 2025. Evidence-Based Guideline on the Prevention and Management of Perioperative Pain for Breast Cancer Peoples in a Low-Resource Setting: A Systematic Review Article. (cited 2025 Feb 19).

Klein S.M., Bergh A., Steele S.M., Georgiade G.S. and Greengrass R.A., 2000. Thoracic paravertebral block for breast surgery. Anesth Analg., **90**(6):1402–5.

Lynch E.P., Welch K.J., Carabuena J.M. and Eberlein T.J., 1995. Thoracic epidural anesthesia improves outcome after breast surgery. Ann. Surg., **222**(5):663–9.

Mahmoud A.A.A., Elramely M.A. and Elmoutaz H., 2016. Thoracic Epidural Analgesia versus Dexmedetomidine Infusion in Traumatic Flail Chest. Pain Stud Treat, **4**(2):18–27.

Plesca M., Bordea C., El Houcheimi B., Ichim E. and Blidaru A., 2016. Evolution of radical mastectomy for breast cancer. J. Med. Life, **9**(2):183–6.

Ravi P.R. and Jaiswal P., 2017. Thoracic Epidural Analgesia for Breast Oncological Procedures: A Better Alternative To General Anesthesia. J. Mar. Med. Soc., **19**(2):91.

Thoracic epidural anesthesia for pain relief and postoperation recovery with modified radical mastectomy - PubMed (Internet). (cited 2025 Mar 9).