Thoracic epidural anesthesia for perioperative anesthesia and post-operative analgesia in a patient posted for modified radical mastectomy: A case report

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ABSTRACT

Modified radical mastectomy is usually performed under general anesthesia, but patients with significant comorbidities or difficult airways face higher perioperative risks. Thoracic epidural anesthesia (TEA) provides a safer alternative by ensuring effective surgical anesthesia, superior analgesia, and stable hemodynamics. We report the case of a 65-year-old female with invasive ductal carcinoma and multiple comorbidities, uncontrolled diabetes, hypertension, coronary artery disease, and previous difficult weaning after general anesthesia, who underwent modified radical mastectomy with TEA. The epidural was placed at T8, achieving a C7 block, and dexmedetomidine infusion was used for sedation. The 180-min procedure was completed under TEA with spontaneous ventilation and stable hemodynamics, without complications. Epidural analgesia provided excellent post-operative pain control. TEA, especially when supplemented with dexmedetomidine, is an effective and safe alternative to general anesthesia for high-risk patients, minimizing airway and hemodynamic risks while enhancing recovery.

Key words: Dexmedetomidine, Difficult airway, Modified radical mastectomy, Post-operative analgesia, Thoracic epidural anesthesia

Breast cancer is the most common cancer among adult women in India, according to Indian Council of Medical Research data [1]. The treatment in most cases is surgery, either breast-conserving surgery with adjuvant radiotherapy or a modified radical mastectomy. Typically, a modified radical mastectomy is done under general anesthesia [2]. In patients with underlying comorbidities, especially cardiac conditions, general anesthesia becomes increasingly difficult to administer due to the sympathetic surge of induction, airway manipulation, and hemodynamic fluctuations [3]. In patients with a difficult airway and underlying cardiovascular disease, this becomes challenging. Regional anesthesia techniques, including thoracic epidural anesthesia (TEA), offer a suitable alternative in such patients [4-6]. They have been shown to provide excellent analgesia, reducing the need for other analgesic agents, help avoid nausea and vomiting, avoid the need for mechanical ventilation, and provide post-operative recovery [6]. TEA used as a sole anesthetic or with an adjunct sedative such as dexmedetomidine provides an easier and safer alternative. Dexmedetomidine, a selective alpha2 agonist, provides safe anxiolysis and sedation without respiratory depression [7-9].

We present a case where TEA was supplemented with an infusion of injection dexmedetomidine for a modified radical mastectomy in a patient with multiple comorbidities for whom general anesthesia was avoided due to airway and cardiovascular risks.

CASE REPORT

A 65-year-old female diagnosed with invasive ductal carcinoma (T2N0M0) was posted for a modified radical mastectomy. She presented with complaints of pain and a dragging sensation in her left breast for 2½ months and was diagnosed after a fine needle aspiration cytology was done. She had type 2 diabetes mellitus on tablet glimepiride 2 mg TDS and systemic hypertension for 18 years on tablet amlodipine 5 mg OD. However, she was non-compliant. During her pre-anesthetic checkup, she was found to have uncontrolled blood sugar values (400 mg/dL, ketones negative). After endocrine

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consultation for optimization of blood sugars, the patient was started on insulin therapy. Her uncontrolled blood pressure, at 200/100 mmHg, was managed and stabilized with oral antihypertensive medication (tablet amlodipine 2.5 mg OD). She had been diagnosed with coronary artery disease 15 years ago, for which she was on cardioprotective medication (tablet atorvastatin 20 mg OD and tablet aspirin 75 mg OD). A 2-D echocardiography study showed left ventricular hypertrophy with trivial mitral regurgitation, with an ejection fraction of 55%. She had undergone a laparoscopic cholecystectomy a few months earlier under general anesthesia.

Following the completion of the laparoscopic surgical procedure, a trial of weaning was attempted. However, she was unable to generate adequate tidal volumes and was subsequently transferred to the intensive care unit (ICU) with an endotracheal tube for mechanical ventilation. She was later weaned from mechanical ventilation and extubated on the 3rd post-operative day. She had anticipated a difficult airway with an MPS grade 3, short neck, double chin, fixed upper jaw dentures, and missing teeth in the lower jaw. Due to multiple comorbidities, along with an anticipated difficult airway and history of difficult weaning, prior history of extubation failure, and an American Society of Anesthesiologists (ASA) Grade of 3, she was counseled for TEA, and written consent was obtained.

Inside the operating room, Standard American Society of Testing and Materials monitors were applied to the patient, which included a pulse oximeter, non-invasive blood pressure cuff, and electrocardiogram (ECG) electrodes. Her baseline values were as follows: HR-72/min, BP 160/100 mmHg, and oxygen saturation (SpO_2) 96%. Under aseptic precautions, a thoracic epidural (B Braun Perifix) (Fig. 1) was inserted using an 18-gauge Touhy's needle in the sitting position at the Thoracic 8 level and fixed at 11 cm using the loss of resistance technique. She was given a test dose of 3 mL of 2% injection lignocaine + adrenaline (1:200000) followed by a loading dose of 12 mL injection lignocaine + adrenaline in aliquots of 5 mL. Sensory block was achieved up to C7 bilaterally (assessed by the pinprick method), following which surgery was started. After confirming the sensory level, the patient was started on an infusion of injection dexmedetomidine at 0.5 mcg/kg/min. The surgical procedure lasted for 180 min. During this period, she received two additional doses of injection bupivacaine 0.25% (8 mL each) whenever she experienced pain. Throughout the operation, the patient remained calm, easily arousable when called, continued to breathe spontaneously, and maintained stable hemodynamics. Over the entire 180-min duration, her vital parameters were steady: heart rate ranged from 68 to 75 beats/min, blood pressure stayed between 140–160 and 85–100 mmHg, and her SpO_2 was consistently between 96% and 99% while receiving oxygen through a Hudson mask. There were no instances of bradycardia, hypotension, or oxygen desaturation. Urine output was satisfactory, and intraoperative blood sugar levels were well controlled. She did not experience nausea or vomiting. Oxygen was administered through a Hudson mask, and there were no episodes of bradycardia, hypotension, or desaturation. She did not require any opioids or non-steroidal anti-inflammatory drugs during the operation.

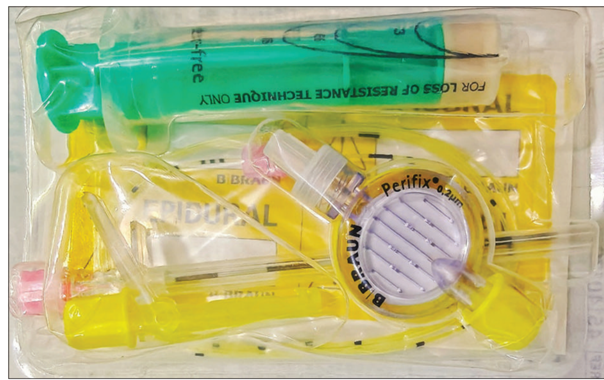

Figure 1: Thoracic epidural kit used for epidural catheter placement

Postoperatively, she was started on injection ropivacaine 0.125% with injection fentanyl as an adjuvant as infusion (B Braun Perfusor compact) (Fig. 2) via her epidural catheter. She was pain-free and did not require any rescue analgesics for the next 48 h. No symptoms of nausea, vomiting, bradycardia, respiratory difficulty, or hemodynamic instability were noted during her post-operative period, and she was discharged after 6 days with good recovery.

The patient was followed up during her hospital stay and at a 2-week post-discharge clinic visit. Her surgical wound was healing well, her pain remained well-controlled without additional analgesics, and her blood sugar and blood pressure were within acceptable ranges. She reported a satisfactory recovery experience.

DISCUSSION

TEA offers significant advantages for patients with ASA Grade 3 and above, undergoing breast surgery, particularly those with multiple comorbidities or a predicted difficult airway [2,4,9]. In this case, the patient had a short neck and a Mallampati score of 3, making endotracheal intubation potentially challenging. She also had a prior history of difficult weaning and extubation requiring admission into the ICU. Avoiding general anesthesia helped eliminate the risks associated with airway instrumentation, including hypoxia, aspiration, airway trauma, and the stress response due to laryngoscopy. Literature supports that regional techniques reduce airway-related complications and, most importantly, attenuate the neuroendocrine stress response associated with surgical stimulation, contributing to improved perioperative outcomes [3,5,10].

In addition to avoiding airway manipulation, TEA provides superior perioperative analgesia through accurately placed segmental blockade, enabling

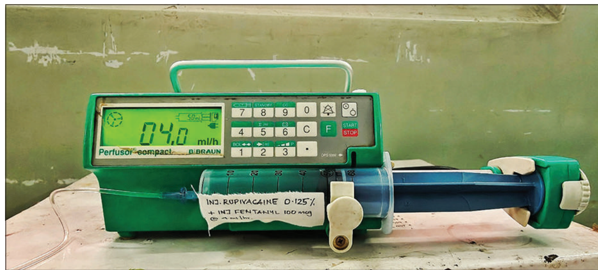

Figure 2: Syringe infusion pump setup for continuous epidural analgesia in the perioperative period

excellent pain control and significantly reducing opioid requirements [11-13]. Reduced opioid exposure minimizes nausea, vomiting, sedation, and respiratory depression, enabling faster recovery [5]. TEA has also been shown to maintain cardiovascular stability by reducing sympathetic outflow, lowering myocardial oxygen consumption, and improving coronary perfusion. This advantage is clinically relevant in patients with coronary artery disease, where hemodynamic fluctuations and increased myocardial workload may precipitate ischemia or arrhythmias [4,5].

Dexmedetomidine served as an effective adjunct in this case, providing an appropriate level of sedation and anxiolysis while preserving spontaneous ventilation [6,14]. It has analgesic-sparing properties and a favorable respiratory profile compared to other sedatives, with several studies demonstrating its safety and efficacy in combination with regional anesthesia [8,15]. The use of dexmedetomidine further enhanced patient comfort without compromising airway patency or hemodynamic status.

Overall, this case highlights TEA as a safe and effective alternative to general anesthesia for modified radical mastectomy in high-risk patients. For individuals with multiple comorbidities, cardiac compromise, or an anticipated difficult airway, TEA can offer stable hemodynamics, excellent analgesia, reduced opioid dependence, and avoidance of airway manipulation, additionally providing a means for post-operative analgesia, hence improving surgical safety and post-operative recovery [3,4]. Similar successful applications of TEA in high-risk breast surgery patients with significant cardiac or pulmonary comorbidities have been documented in other case reports [14,15].

CONCLUSION

TEA with dexmedetomidine is a feasible and effective anesthetic technique for breast surgery in patients with multiple comorbidities and difficult airway anatomy. It reduces perioperative complications and enhances recovery through superior analgesia, opioid reduction, and hemodynamic stability. Larger studies would help to position TEA as the anesthesia of choice for patients requiring radical mastectomy under any ASA risk.

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