

Combined thoracic segmental spinal anesthesia and erector spinae plane block in high-risk patients undergoing thoracoscopic surgery: A case series

ABSTRACT

Thoracoscopic surgery in high-risk patients with severe respiratory disease is associated with a high morbidity and mortality rate. Though general anesthesia is the first-line anesthetic strategy for thoracoscopic surgeries, it poses a significant risk. When the hazards of general anesthesia outweigh the benefits of the procedure, there is a moral quandary over whether thoracoscopy should still be the option for patients with severe respiratory disorders. Thoracic segmental spinal anesthesia in combination with erector spinae block may emerge as an excellent alternative to general anesthesia in terms of analgesic efficacy, patient recovery profile, and minimal complication rates if administered by experienced hands. Unfortunately, there is paucity of literature exploring the impact of regional techniques and their outcomes on these patients. In this case series, we aim to emphasize that combined thoracic segmental spinal anesthesia and erector spinae plane block are a safe and effective alternative to general anesthesia in thoracoscopic surgeries.

Key words: Erector spinae block, fentanyl, levobupivacaine, thoracoscopic surgery, thoracic segmental spinal anesthesia

Introduction

Thoracoscopy is a procedure generally performed under general anesthesia (GA). It carries a high risk of ventilator dependency, morbidity, and mortality in patients with severe respiratory disease. This case series emphasizes that combined thoracic segmental spinal anesthesia and erector spinae plane (ESP) block is a better alternative to GA in patients with severe lung pathology undergoing thoracoscopic surgeries. Written informed consent was taken from all patients for publishing the data and images for academic purposes.


Case 1

A 72-year-old, 60 kg male, presented with dry cough and shortness of breath. He had history of type 2 diabetes mellitus and hypertension and was on oral hypoglycemic and anti-hypertensive medications. He had a known case of chronic liver disease and had grade 2 esophageal varices. His room air saturation was 90% with reduced breath sounds on the right side. Patient had poor effort tolerance. Chest X-ray [Figure 1a] showed gross right pleural effusion.

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Figure 1: (a) Chest X-ray of Case 1 showing right pleural effusion, (b) chest X-ray of Case 2 showing massive right pleural effusion, (c) CECT thorax of Case 3 showing left pleural effusion

Case 2

A 61-year-old, 42 kg female, presented with dry cough with breathlessness of 2 weeks, right-sided non-radiating chest pain of 2 days duration. She had history of COVID-19 infection, hypertension, hypothyroidism, and type 2 diabetes mellitus and was on anti-hypertensive and oral hypoglycemic medications. She was on maintenance hemodialysis for end stage renal disease. Her saturation on room air was 86%, with diminished breath sounds on the right side. Chest X-ray [Figure 1b] showed massive right-sided pleural effusion. Patient had poor effort tolerance. Preoperative investigations showed platelets 2.7 lakh cells/mm³, serum creatinine 5.1 mg/dl, and serum potassium 5.4 mEq/L.

Case 3

A 60-year-old, 70 kg male, presented with dry cough of 75 days and fever of 20 days duration. He had history of type 2 diabetes mellitus, on oral hypoglycemic agents, also a known case of IHD, on Tab Aspirin 75 mg and Atorvastatin 20 mg. Saturation was 96% on 4 L O₂ via nasal prongs with reduced breath sounds on the left side. CECT Thorax [Figure 1c]

showed gross pleural effusion and patchy consolidation with air bronchogram in the left upper lobe. Patient had poor effort tolerance. 2D echo showed LV segmental hypokinesia with EF of 45%.

All three patients were scheduled to undergo thoracoscopy [Figure 2a-c]. Patients were kept fasting for 6 hours and were given Tab Pantoprazole 40 mg and Alprazolam 0.25 mg on the night before the surgery. On arrival at the operation theatre, venous access was established and intravenous fluids were started as per requirement. Monitoring with blood pressure, electrocardiogram, and pulse oximetry were established.

Under strict asepsis, thoracic spinal anesthesia was performed with the patients in sitting position, using 27G Quincke Babcock needle, through paraspinous approach at T5-T6 intervertebral space [Figure 2d] with 1 ml of 0.5% isobaric levobupivacaine and 25 mcg Fentanyl. Once adequate level of block was achieved (T2-T10), patients were positioned in lateral position. Under aseptic precautions, counting down from C7, the T7 vertebra was identified



Figure 2: (a) Thoracoscope *in situ*, (b) lung visualization, (c) thoracoscopy procedure, (d) thoracic segmental spinal anesthesia procedure at T5-T6 intervertebral space, (e) ultrasound image of erector spinae block

under ultrasound guidance using linear probe. Probe was moved until the erector spinae muscle and transverse process were visualized [Figure 2e]. Using the in-plane technique, 18G Tuohy needle along with 10cm extension was directed towards transverse process underneath the fascia of erector spinae muscle. 2–3 ml of normal saline was injected to confirm the spread and 15 ml of 0.25% Levobupivacaine was injected. Patients were kept spontaneously breathing with O_2 4L/minute via nasal prongs and were put in lateral decubitus position.

During the procedure, vitals were continuously monitored. In case of any impending emergency, laryngoscopes, endotracheal tubes, and other resuscitative equipment were kept ready.

Patient with IHD developed an episode of hypotension which was treated with Injection Phenylephrine 25 mcg bolus. Other two patients developed heart rate <45 bpm which was successfully managed with Injection Atropine 0.6 mg

bolus. All patients underwent thoracoscopic procedure for about 60 to 90 minutes without insufflation involving pleurocentesis and biopsy. Post-procedure, patients were transferred to Respiratory Intensive Care Unit for monitoring. Post-operative course was uneventful.

Discussion

Though ESP block is being used widely for various procedures,^[1] the potential applications of thoracic segmental spinal anesthesia have not been thoroughly investigated. This reluctance is due to technical difficulties, inclination of the thoracic vertebra, and proximity of the spinal cord. However, this has been overcome through studies by Imbelloni *et al.*^[2] and Lee *et al.*,^[3] which showed that the depth of subarachnoid space was greater at mid-thoracic region (T5). Also, spinal cord and surrounding tissues separate more posteriorly when compared to the higher and lower regions. Hence, we chose T5-T6 interspace for these patients.

Abdelaal Ahmed Mahmoud *et al.*^[4] used thoracic spinal anesthesia at T5-T6 level for mastectomies and found that it was associated with better hemodynamics and higher patient satisfaction. Numerous studies have shed light on the role of thoracic spinal anesthesia in modern anesthetic practice.^[5-9]

We chose isobaric levobupivacaine as it has negligible adverse cardiovascular and neurological effects. Fentanyl improves the quality of spinal anesthesia when used as an adjuvant to local anesthetic.^[10]

In our study, thoracic segmental spinal anesthesia was administered by an experienced anesthesiologist and none of the patients complained of paraesthesia. The sensory level attained in all three patients was between T2-T10. None of the patients required supplementary analgesics or conversion to GA. ESP block augmented the analgesic effect. Though we noticed hypotension and bradycardia intra-operatively, it was successfully managed by vasopressors and atropine. We did not come across any patients' developing headache, pruritus, dyspnea, or urinary retention in the postoperative period. All patients had early recovery and ambulation. Since low dose of levobupivacaine along with fentanyl was used to block fewer segments and prevent cardiorespiratory complications, we combined ESP block for providing prolonged anesthesia and analgesia. Further studies may reveal better observations and conclusions.

Conclusion

Combined thoracic segmental spinal anesthesia and ESP block are an excellent alternative to GA for thoracoscopic surgeries in patients with multiple comorbidities. Hemodynamic stability, superior analgesia, quicker recovery, and early ambulation were achieved. Henceforth, we recommend more widespread use of this combined technique.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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