

## Case Report

# Thoracic Segmental Spinal Anesthesia in Patient with Severe COPD in Open Cholecystectomy

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### Abstract

**Background:** Regional anesthesia is preferred in most of the chronic obstructive pulmonary disease (COPD) patients to avoid intra- and postoperative complications related to general anesthesia. Herein we reported a case of empyema gall bladder with severe COPD who went for an open cholecystectomy under thoracic segmental spinal with epidural anesthesia. He had substantial dyspnea on routine household activities (NYHA Class III). He had history of several hospital admissions with acute onset of dyspnea and was treated with bronchodilators and systemic steroids. He had no history of other comorbidity. The patient was scheduled for an emergency laparotomy followed by open cholecystectomy. Postoperative recovery was uneventful allowing the patient to be discharged on the 5th POD.

**Introduction:** Chronic Obstructive Pulmonary Disease (COPD) is one of the common pulmonary disorders encountered in anesthetic practice, and its prevalence increases with age. The disorder is strongly associated with smoking and male predominance. The anesthetic management of patient with severe COPD poses significant challenges to the anesthesiologists.<sup>1</sup> Thoracic segmental spinal anesthesia is a technique of regional anesthesia that can be a suitable alternative to general anesthesia, particularly in patients who are considered at high risk for general anesthesia. Anesthetic management of a patient with severe COPD presents a definitive risk of intra and postoperative complications such as bronchospasm, laryngospasm, CO<sub>2</sub> narcosis and prolonged mechanical ventilation respectively.<sup>2</sup> Atelectasis and ventilation-perfusion mismatch may adversely affect ventilation and oxygenation in intraoperative as well as postoperative period.<sup>3</sup> It is beneficial to choose regional anesthesia over general anesthesia to decrease the risks. We report this case of a 65years old patient with severe COPD

who was admitted for an open cholecystectomy. The surgery was performed successfully under the thoracic segmental subarachnoid block (spinal) with epidural anesthesia.

### CASE REPORT

A 65 years old male, retired government officer, who presented to our hospital with sudden onset of severe upper abdominal pain for 4days, radiation of pain to back, nausea & vomiting. Ultrasonography of upper abdomen revealed cholelithiasis with pathological GB having possibilities of empyema/GB mass. CT-scan of upper abdomen was also suggested of empyema of GB. Detailed history revealed that he was a diagnosed case of COPD for last 25 years, with moderate to severe functional impairment. He had substantial dyspnea on routine household activities (NYHA Class III). He had history of several hospital admissions with acute onset of dyspnea and was treated with bronchodilators and systemic steroids. He was on a total daily dose of prednisolone-20mg, take

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seretideacuhaler of fluticasone and salmeterol but he stopped taking for last 2 years. He had no history of other comorbidity. The patient was scheduled for an emergency laparotomy followed by open cholecystectomy.

On pre-anesthetic evaluation, the patient was anxious, restless, with heart rate of 108 beats/min, BP-130/80 mmHg, respiratory rate-18 breaths/min and his SpO<sub>2</sub> was 93%-95% breathing room air. The patient had respiratory distress and wheeze was audible from outside without stethoscope. Preoperative investigation findings were: Hb-9.9gm/dL, WBC count-20,800/ $\mu$ L, neutrophil-88%, platelet-296/ $\mu$ L. There were bilateral inflammatory signs and prominent vascular markings on chest radiograph. His ECG was within normal limit but the echocardiogram showed fair LV systolic function (EF-51%), mild hypokinesia in basal inferior septum and basal wall of mid inferior part. On the basis of clinical evaluation and investigation findings and after detailed discussion with surgeons and relatives of patient, decision was taken to provide regional anesthesia.

On the previous night of surgery patient received his regular dosage of bronchodilators and steroids. Alprazolam was given on prior night for anxiolysis and other premedication was avoided. The patient was nebulized with salbutamol and ipratropium bromide half an hour before surgery. Preoperative baseline vitals of pulse, NIBP, SpO<sub>2</sub>, and ECG were recorded. A peripheral venous access was secured.

Under all aseptic precautions, an epidural puncture was performed at 8th thoracic space with a 16G Touhy needle in sitting position then an epidural catheter was introduced and the catheter was secured leaving 4cm inside. Then, a 25G Quinke needle was introduced in the subarachnoid T9-T10 interspace. Once the flow of CSF confirmed the correct placement, 1.5ml of 0.5% plain Bupivacaine mixed with 12.5 $\mu$ g of Fentanyl and 1mg dexamethasone was administered. Finally, the patient was turned supine horizontal and oxygen at 5L/min was started with Hudson's facemask. The dermatome level of anesthesia was achieved from T5 to T10, preserving the movement of lower limb. The heart rate was within 70-100b/min, SBP was within 70-110mmHg and DBP was within 54-75mmHg.

The episode of hypotension following the subarachnoid block was corrected with intravenous Ephedrine 10mg bolus along with bolus of 200ml of intravenous crystalloid fluid. Upper and lower levels of sensory (pinprick) and motor block (Modified Bromage scale) were recorded and assessed for 10 min and the surgery was initiated. Intra-operative sedation was avoided. The patient was comfortable till first 90 minutes and then the surgeon experienced tightness of muscle at the time of closing causing pushing out the gut towards the field. At the same time the patient started coughing and complained of discomfort. Then, a bolus (6ml 0.5% plain Bupivacaine + 2ml 2% Lignocaine + 50 $\mu$ g Fentanyl) was given through epidural catheter which settled the patient within next 10min. Duration of surgery was 130 minutes. There was no further distress and hemodynamic compromise. Postoperative analgesia was maintained for next 3 days by continuous infusion of 0.125% plain Bupivacaine with Fentanyl through syringe pump. Postoperative recovery was uneventful allowing the patient to be discharged on the 5th POD.

## DISCUSSION

COPD is a common condition which is characterized by progressive development of airflow limitation that is not fully reversible. Smoking is associated with emphysema which is a variant of COPD. Mild emphysematous changes are a normal, clinical insignificant consequence of aging. In emphysematous type of COPD there is pathological deterioration in elasticity or recoil within the lung parenchyma and there is pathological changes that decreases rigidity of bronchial wall and thus predispose them to collapse during exhalation. These leads to decreased diffusion lung capacity, (V/Q) mismatch and impairment of gas exchange. The pulmonary function test (PFT) shows increase in residual volume and decrease in FEV<sub>1</sub>, vital capacity and FEV<sub>1</sub>:FVC < 70%.<sup>4,5</sup> Under general anesthesia, the altered pulmonary physiological changes noted in COPD, get exacerbated, due to cephalad movement of diaphragm, paralysis of intercostals muscles, and limited movement of the posterior diaphragm.<sup>6</sup> Hence there is a high risk of postoperative complications such as mechanical ventilation, respiratory distress syndrome and frequent requirement of tracheostomy due to prolong mechanical ventilation.

As a result, regional anesthesia is considered preferable to general anesthesia. Among different variety of regional anesthesia thoracic segmental spinal block with epidural anesthesia was chosen because combining the subarachnoid block with epidural block eliminates the possibility of inadequate muscle relaxation for surgery and provide good quality of analgesia, eliminating the need for large doses of other systemic analgesics.<sup>7</sup>

In our case, the patient was successfully managed under thoracic segmental spinal along with epidural anesthesia. The greatest cause of concern in the administration of segmental spinal anesthesia is the possibility of accidental medullary puncture with transient or definitive neurological sequelae. In different studies it is found that, there are larger distance between the Dura mater and the spinal cord in between T5 and T6 and shortest distance in between Dura mater and spinal cord found in T2 and T10.<sup>8,9</sup> This may be explained with the fact that in the mid thoracic region, the spinal cord is ventrally located, more distant from the Dura mater, mainly when the patient is in a forced thoracic flexion.<sup>10</sup> This also explains why in a study with 113 thoracic epidural punctures and incidence 4.4% of Dural perforations in this region there were no neurological sequelae.<sup>11</sup>

Second concern is that the higher level of block in thoracic segments can affect ventilation adversely. However, diaphragm remains unaffected in this procedure as it is innervated from the cervical level (C3, C4). The forceful expiration and coughing affected due to paralysis of the muscle of anterior abdominal wall. As per concern of hemodynamic changes, MAP change was minor and insignificant; in spite of neuraxial blockade, this is because the motor power of the lower limbs were preserved, a low dose of local anesthetic was used, and the patient remained conscious throughout the procedure, avoiding the central depression of circulation.<sup>12</sup>

Different studies show that segmental thoracic spinal anesthesia provide good analgesia both intra-operative and postoperative period, it shorten the stay in hospital, low incidence of PONV and the patients were highly satisfied with the anesthetic, due

to motor control of lower limbs, early mobilization.<sup>12,13</sup>

## CONCLUSION

We present this case to demonstrate the comprehensive planning at an emergency situation, coordination of care and anesthetic management involved in ensuring optimal outcome. Our primary concern was to provide good and safe anesthesia. We recommend further evaluation as well as more experience and familiarity of the anesthetist with thoracic segmental spinal anaesthesia.

## COMPETING INTEREST

There is no competing interest

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