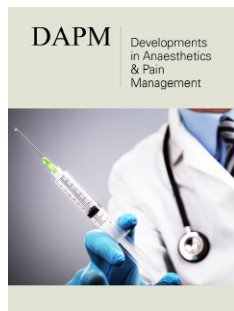


Segmental Thoracic Spinal Anesthesia with Ultrasound Guided Erector Spinae Plane Block for Cholecystectomy in Patient with Severe Lung Disease

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Abstract

General anesthesia is associated with a risk for postoperative pulmonary complications. The risk is even higher in patients with chronic respiratory failure, and post-operative morbidity and mortality rates are also high. Proper peri-operative anesthetic management is important in such patients. Therefore it is essential to optimize the patient's physical status before anesthesia and perform optimal anesthesia technique based on the pre-anesthetic evaluation of the patient's pulmonary function.

Keywords: Anesthesia; Cholecystectomy; Lung disease; Blood investigations; Bronchospasm

Introduction

Regional anesthesia is considered a favorable modality in selected patients and is becoming more popular day by day. In this regard, we are presenting a case report of 60 year old female patient with post koch's sequelae-left sided destroyed lung, who needed surgery to remove a gall-bladder due to Acute Calculous Cholecystitis. After discussion with the surgical faculties, and proper pre-op optimization of the patient, segmental thoracic spinal anesthesia along with ultrasound guided right side erector spinae plane block was planned, and the patient underwent an open cholecystectomy awake with spontaneous respiration. Although not routinely used, this procedure has shown advantage in maintaining hemodynamic stability for this patient, and we could avoid the morbidity associated with general anesthesia. Moreover, this study has shown that erector spinae plane block at T8 level has delayed the need of post-operative rescue analgesia.

Case Report

A 60-year-old female patient, with 156cm height and 61kg weight, was scheduled for cholecystectomy. She had a history of tuberculosis destroyed left lung and asthma, for which she was taking inhaler- fluticasone and formeterol occasionally. Initial assessment showed-vitals within normal range, central nervous system and cardiovascular system examination normal, chest auscultation revealed decreased left sided air entry in upper and lower zone. Abdominal examination showed right upper quadrant tenderness.

a. Investigations

All the blood investigations were within normal range, ecg showed T wave inversion in lead 3, v2, v3, v4, chest radiograph showed-Homogenous opacity with calcification in the left

upper and middle zone, suggesting post-infection fibrocalcified changes with shift of mediastinum towards left side-suggesting fibrotic collapse. Fibrocalcified Lesions in right upper zone (Figure 1), preoperative pulmonary function test result and preoperative arterial blood gas analysis showed in Table 1 & 2 respectively. 2d echo showing-ejection fraction 60%, RVSP 42mmhg, RA RV mld dilated, moderate TR, mild PAH, and Abdominal ultrasound was showing 11mm gallbladder calculi with changes of acute calculouscholecystitis.



Figure 1: Performing thoracic segmental spinal anaesthesia with patient in sitting position.

Table 1: Preoperative pulmonary function test. FVC-Forced Vital Capacity; FEV1-Forced Expiratory Volume in one second; FEF 25%-75%-25%-75% of forced expiratory flow; PEF-Peak Expiratory Flow; Pre %Ref-ratio of actual value to predicted value.

Variable	Predict Value	Actual Value	Pre% Ref
FVC(L)	1.97	0.69	35
FEV1(L)	1.65	0.54	32.7
FEV1/FVC(%)	77.7	78.26	100.7
FEV25%(L/Sec)	4.1	1.31	32
FEV75%(L/Sec)	1	0.34	34
PEF (L/Sec)	4.54	1.36	30

Table 2: Preoperative arterial blood gas analysis. pH-arterial pH; PaCO₂-arterial carbon dioxide tension; PaO₂-arterial oxygen tension; BE-arterial base excess; SaO₂-arterial oxygen saturation; FiO₂-fraction of inspired oxygen; PreOP-a day before operative day.

Variable	pH	PaCO ₂	PaO ₂	BE(mmol/L)	SaO ₂ (%)	FiO ₂
PreOP	7.45	35.1	80.7	-2.7	95.4	0.21

Anaesthetic Management

Morning nebulization was given. Open cholecystectomy was opted rather than laproscopic approach to avoid undesirable effects of pneumoperitoneum on the patient's respiratory and cardiovascular system. After discussing the advantages vs disadvantages of regional versus general anesthesia with patient,

her family and surgeon, written informed consent was taken and patient was transferred to the operation room, standard monitoring was applied and a fullbackup general anesthesia plan was kept ready to be performed if needed. Under complete strict aseptic conditions, in sitting position, lidocain 2% 2ml used for local skin infiltration. Than at T8-T9 level-25 G Quinkee spinal needle was introduced using a midline approach until free flow of csf obtained. Isobaric Ropivacaine (ROPIN® 0.75%, NEON, ROPIVACAINE 7.5mg/ml, 20ml) 18.75mg (volume 2.5ml) with dexmedetomidine 5mcg (Dexem™, THEMIS MEDICARE LIMITED, India, 100mcg/ml, 1ml ampoule) were injected gently. After that, patient was positioned in supine position. Sensation was assessed with pin prick test and than sensory block was confirmed after 3 minutes. Motor functions of lower limb not affected. For the Erector Spinae Plane Block, patient was positioned on the left lateral with the right side up. The spinous process of T8 vertebra was marked. After sterilization, with the help of The Mindray 7L4a linear ultrasound probe with a frequency bandwidth of 5.0/7.5/10.0 megahertz-the right sided 8th transverse process was identified. Than a 25 gauge disposable spinal needle was inserted and arrived at the tip of the 8th transverse process. A total of 0.375% ropivacaine injected with increments of 5ml with negative aspiration each time. Success of the ESPB was confirmed by obtaining the ultrasound image of the craniocaudal spread and subsequently performing multidermatomal thermal changes to cold stimulus patient perceived on right side (Figure 2). Injection midazolam was administered IV for sedation, 2 Litre/minute of oxygen was administered using nasal cannula. The operation was completed within 1 hour, no intraoperative complications occurred and patient was transferred to the post anesthesia care unit.

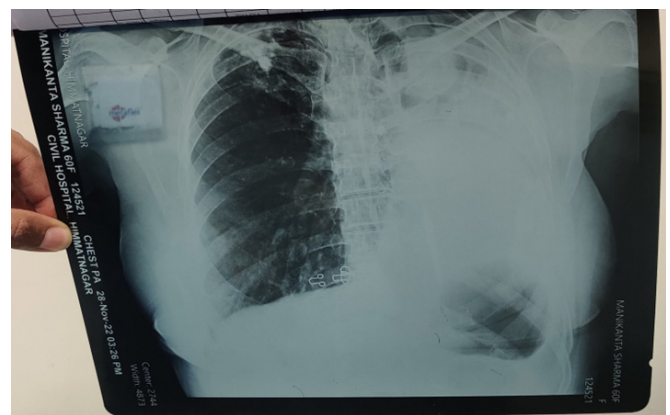


Figure 2: Pre-Operative Chest X-ray of the patient-showing homogenous opacity with calcification in the left middle and upper zone, suggesting postinfective fibrocalcified changes with shift of mediastinum towards left side-suggesting fibrotic collapse.

Discussion

Patient with pre-existing respiratory disease are at a greater risk for pulmonary complications, such as respiratory infections, respiratory failure, atelectasis, pneumothorax, icu admission, bronchospasm, and aspiration following general anesthesia [1]. Tracheal intubation, mechanical ventilation and use of

neuromuscular blockers are all necessary for GA. These techniques can cause number of complications like bronchospasm, ventilation-perfusion mismatch, lung infiltration, atelectasis, and decreased respiratory muscle function due to residual muscle relaxation [2]. Abdominal surgery significantly increases the risk for respiratory complications [3]. Regional anesthesia has fewer effects on the respiratory system than general anesthesia. After reviewing the literature about similar cases and pre-op optimization of the patient, the decision to perform regional anesthesia was made for the benefits mentioned above. Van Zndert AAJ et al. [4] reported that segmental spinal anesthesia can be safely used in patients with severe lung disease [4]. The most dreaded complication of the thoracic segmental spinal anesthesia technique is injury to the spinal cord, since the needle is inserted above the level of terminaton of spinal cord. Recent studies regarding the anatomy of thoracic spinal canal [5] with MRI revealed that there is substancially more space in the posterior subarachnoid space at midthoracic level then at lumbar and upper thoracic levels (Figure 3 & 4). Thus cautious use of intrathecal injection in the thoracic segment is another option without much fear of traumatizing the spinal cord. The ESP block generates extensive blockade of the posterior, lateral and anterior thoracic and abdominal-thus alleviates the incisional pain as well as visceral autonomic pain [6,7].



Figure 3: Intraoperative picture of patient, patient is comfortable without endotracheal tube.



Figure 4: Intraoperative monitoring, stable hemodynamic condition.

Conclusion

This case report demonstrates that regional anesthesia is a suitable alternative for GA in some high risk cases where morbidity and mortality is high. It provides pain free interval after surgery, reduces the need for analgesics and opioids, and lowers the risk of pulmonary complications as well as incidence of PONV significantly [8].

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