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Case Report - Video Assisted Thoracoscopic Surgery in Prone Position for Transhiatal Oesophagectomy for Carcinoma Oesophagus

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Introduction

Oesophageal cancer is an aggressive malignancy associated with poor prognosis. It is the 6th leading cause of death due to cancer and the 8th most common cancer type in world. The 5-year survival is around 15–25%, if diagnosed in early stages [1].

Thoracoscopy involves intentionally creating a pneumothorax and then introducing an instrument through the chest wall to visualize the intrathoracic structures. Transhiatal esophagectomy as the treatment modality for benign and malignant diseases of the esophagus has become popular in the last 2 decades [2]. When transhiatal was compared with transthoracic oesophagectomy for oesophageal cancer in prospective studies, both showed equal long term survival rates [3-5]. Transhiatal method is preferred by many surgeons because in this thoracotomy and potential morbidity is avoided [2]. But, esophagectomy in general, is an extensive procedure,it is associated with some mortality, considerable morbidity, and lengthy recovery.

Video-assisted thoracoscopic surgery (VATS) is considered to be 'minimally invasive' when compared with open thoracotomy. The patient population may be either very healthy individuals undergoing diagnostic procedures, or patients at high risk undergoing VATS to avoid open thoracotomy. Decreased postoperative pain, earlier mobilization, lower overall morbidity, a shortened hospital stay with reduced costs, a cosmetic incision, and for some procedures, a reduced operating time are some of the advantages of VATS.

Case Report

43 yr old male patient came with complaints of increased dysphagia, loss of appetite, weight loss since 1 week. He was diagnosed with carcinoma oesophagus middle third part since 3months, recently diagnosed with type 2 diabetes mellitus on regular treatment admitted for oesphagectomy. Patient's preoperative investigations were within normal limits, had no acute cardiopulmonary symptoms, systemic examination was normal, no abnormality detected on airway examination.

Informed/written high risk consent for anesthetic risks and complications was taken, postoperative mechanical ventilation consent taken, patient was explained about epidural analgesia+general anesthesia procedure.

Patient was shifted to operation theatre, all non invasive monitors connected. 18 gauge intravenous access secured in left hand. Patient was positioned in left lateral position, under sterile aseptic precautions back painted and draped, T7-T8 epidural space identified, local infiltrated with 2% lignocaine in same space. Track created using track needle, epidural space identified by loss of resistance technique using 18 gauge tuohy's needle, catheter placed and fixed at 8cm at skin. Air bubbles aspirated and position was confirmed. Test dose administered and position reconfirmed. Preoxygenation done with 8L oxygen for 3minutes, premedication done with inj

glycopyrrolate 0.005mg/kg IV, inj fentanyl 2mcg/kg IV. Induction done with inj propofol 1-2mg/kg IV, inj succinylcholine 1mg/kg. intubation done with 36F double lumen endotracheal tube, position confirmed by auscultation and connected to mechanical ventilation. Invasive monitors like central venous pressure monitoring in right internal ugular vein and arterial blood pressure monitoring in left radial artery secured. Patient was put in prone position by padding all the pressure points adequately. Anesthesia maintained with nitrous oxide + sevoflurane + vecuronium. Intraoperatively bolus dose of 0.125% levobupivacaine administered by epidural catheter and intermittently 10 ml, 5ml, boluses were administered. Intraoperatively during one lung ventilation patient developed high peak pressure amd hypercapnia, desaturation and hypoxia. Postion of the endotracheal tube reconfirmed through fibreoptic bronchoscopy, FiO2 increased to 1.0. Recruitment manoeuvres performed on the dependent ventilated lung to eliminate atelectasis. PEEP increased to 5. Oxygenation improved and hypoxemia ws reduced. Patient developed hypotension which responded to fluids and bolus inj mephenteramine 6mg IV. After the surgery patient was put in supine position, double lumen tube removed after thorough oral suctioning and single lumen 8mm size tube inserted and patient transferred to post operative ward and connected to mechanical ventilator support on pressure control mode. Epidural infusion of 0.125% Levobupivacaine + 100mcg fentanyl started at 8ml/hr.

24hr postoperatively chest xray was normal, ABG within normal limits, ICD drain had 150ml, patient had good breathing efforts, he was extubated and advised chest physiotherapy, adequate antibiotics added. Epidural infusion was continued for another 2 days to maintain adequate analgesia, after 2 days epidural catheter removed, patient mobilised, shifted to ward on parenteral analgesics.

Discussion

VATS for lung biopsy and small procedure for lung pathology can be performed under local anesthesia or regional anesthesia but for oesophageal resection it requires general anesthesia.

VATS under general anesthesia is usually done with single lumen endotracheal tube. But, if the lungs are not separated, when positive-pressure ventilation is given to both lungs, it prevents lung collapse on the operated side, resulting in inadequate surgical exposure.

To collapse the lung on the operated site a double-lumen endobronchial tube (DLT) or bronchial blocker can be used. A DLT is most commonly used because it provides selective ventilation of the contralateral lung, at the same time allowing for more rapid collapse of the lung on same side.

Oxygenation

Under general anesthesia the ventilation and oxygenation of the patient are monitored by capnography and pulse oximetry. Oxygen saturation of hemoglobin usually remains stable, in particularl if the patient is ventilated with a large tidal volume and 100% oxygen. Direct intra-arterial oxygen monitoring continuously demonstrated significant fluctuations in arterial oxygen pressure (Pao2) and arterial carbon dioxide pressure (Paco2) during routine VATS procedures[6]. These changes were unpredictable and was not detected by non-invasive monitoring. But the changes were transient and did not have any significant clinical relevance. Sometimes serious prolonged decreases in Pao2 have been observed, requiring immediate intervention. In such condition the position of the DLT should be reconfirmed immediately.

The usual treatment for hypoxemia in thoracotomy is the application of continuous positive airways pressure to the

operated upper lung. Inhaled nitric oxide causes selective pulmonary vasodilation. Theoretically if blood flow to the ventilated lung during OLV be increased by dilating the pulmonary artery on that side, then shunt to the collapsed lung would be decreased, improving the oxygenation. There was no improvement seen in oxygenation in patients who become hypoxemic during OLV with inhaled nitric oxide (20 ppm)[7]. But the combination of intravenous almitrine (a potent selective pulmonary vasoconstrictor) and inhaled nitric oxide significantly increases Pao2 in patients with acute respiratory distress syndrome[8]. It was shown that this combination of inhaled nitric oxide and almitrine prevented hypoxemia in patients undergoing VATS[9].

Conclusion

Thus in a short period of time, VATS has replaced many diagnostic and therapeutic procedures performed earlier by traditional thoracotomy. Due to minimal chest wall and muscle trauma, VATS has advantages like less postoperative pain, fewer complications, shorter hospital stay. There is continuous evolvement in the VATS technique refinement of instrumentation assures further applications for selected conditions.The anesthetic management of VATS involves the ability to separate the lungs to provide safe and effective OLV. Prevention of hypoxemia and maintenance of oxygenation are the main anesthetic goals.

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