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RESEARCH ARTICLE

VIDEO ASSISTED THORACOSCOPY SURGERY (VATS) CONVERTED TO OPEN THORACOTOMY FOR RADICAL LEFT UPPER LOBECTOMY IN A GERIATRIC PATIENT: A CASE REPORT

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ABSTRACT

We describe a case report of an 81 years old male, a case of Carcinoma left lung with multiple comorbid conditions posted for video assisted thoracoscopy surgery (VATS) SOS open thoracotomy and radical left upper lobectomy. We performed the procedure under general anaesthesia with a thoracic epidural for post-operative pain relief. CoopdechTM bronchial blocker type A with standard cuff size was used in the left main stem bronchus to achieve one lung ventilation. In this case report, we emphasise the importance of using a thoracic epidural for post-operative pain management and a bronchial blocker for lung deflation in the management of VATS, because incomplete deflation of the nondependent lung during VATS can result in poor surgical exposure and insufficient space for surgical manipulation, compromising the procedure's success. In our case, despite a good deflated operative lung, there was conversion to open thoracotomy due to adherent left bronchus to main pulmonary vessels, but with a good working thoracic epidural, we were able to extubate patient the next day in ICU due to excellent pain relief and an uneventful rest of the postoperative course, so to summarise, despite major open thoracic surgery overall good surgical outcome possible even in geriatric age group patient with multidisciplinary team approach.

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INTRODUCTION

Carcinoma of the lung is common in patients with degenerative lung disease and is the leading cause of death in cancer patients, with surgical resection being the only potential cure. Techniques that improve the safety of pulmonary resection in these patients will expand the pool of patients who can be considered for surgical therapy. These patients are at an increased risk of perioperative pulmonary complications and long-term respiratory impairment following lung resection. For thoracoscopic procedures Video Assisted Thoracoscopic Surgery (VATS) is a less invasive procedure that allows for better visualisation with minimal access. Furthermore, it provides less postoperative pain, fewer operative complications, and a shorter hospital stay. Because it is necessary for the operative lung to be completely deflated for operative ease, one lung ventilation techniques are commonly used during thoracic surgeries. To achieve lung isolation via the orotracheal route, a double lumen endotracheal tube or a single lumen tube in combination with a bronchial blocker is typically used. Thoracic surgeries necessitate one-lung ventilation (OLV) to provide excellent surgical exposure of the affected lung via lung deflation while also ensuring adequate gas exchange with the other lung. On the other hand, these surgeries carry the risk of being converted to open thoracotomy, so a thoracic epidural catheter is usually used to manage postoperative pain because it is

regarded as the best modality for postoperative pain management and leads to a good surgical outcome. We are reporting perioperative management of an 81 yrs. old male, known case of carcinoma left lung posted for VATS SOS open left upper lobectomy

CASE REPORT

A 81 yrs. old male (height 165cm, weight 63.5kg) known case of hypertension (HTN) and gout had history of throat pain and cough with haemoptysisfor 2 months on further evaluation diagnosed to have Primary pulmonary adenocarcinoma left upper lobe 3 months back ,patient received 3 cycles of neo adjuvant chemotherapy with Pemetrexed and carboplatin and now posted for Video-assisted thoracic surgery (VATS) SOS open thoracotomy for Radical left upper lobectomy with mediastinal lymph node dissection with bronchoscopy sos tracheostomy. A complete pre-anaesthesia assessment was done, routine physical examination was within normal limits, on airway examination he had a mouth opening of 3 finger, Mallampati grade 2, a thyromental distance of 5 cm, all routine blood Investigations were within normal limits however his pulmonary function tests showed moderate obstructive ventilatory defect. ECG showed atrial fibrillation with controlled heart rate and ECHO shown LVEF 55%, mild dilated aortic root with dilated RA and LA. PET scan showed an irregularly marginated highly metabolically active heterogeneously enhancing soft tissue mass with surrounding ground glass opacities and pleural tags in the superior lingula of left lung, encasing the corresponding bronchus, with distal subsegmental atelectasis, A few small to enlarged mildly metabolically active left hilar and mediastinal aortopulmonary window region and left paratracheal nodes were seen, mild left pleural effusion noted along withPersistent dilatation of the ascending aorta (diameter being approximately 4.5cm).

As before, focal disruption of the atherosclerotic intimomedial calcification along the posterior wall of the aortic arch, with a small saccular outpouching measuring 1.2 x 1.0 cm in size, with absence of contrast opacification of its lumen, representing thrombosis. Persistent large mixed hiatus hernia is seen displacing the descending aorta towards right, as before. No metabolically active liver, adrenal, or skeletal lesion is seen, CT guided biopsy was then done which confirmed Primary pulmonary adenocarcinoma. Considering old age, HTN with atrial fibrillation and carcinoma left lung and ascending aorta thrombosed sacular aneurysm in posterior wall of the aortic arch along with major thoracic surgery patient was accepted under ASA grade III, after through discussion with surgical team and multidisciplinary team discussion perioperative management plan was decided and patient and relatives were informed about high risk and need for postoperative ICU and ventilatory support. Once inside the operation theatre standard ASA monitors including electrocardiogram, Oxygen saturation probe and Non-invasive blood pressure cuff applied. A18-gauge cannula was inserted in a left-hand peripheral vein, right radial artery was cannulated under local anaesthesia under all aseptic precautions, following this patient was given left lateral position and after sedating patient with inj midazolam 1mg and inj fentanyl 50mcg, thoracic epidural catheter was inserted at T7 – T8 level with 18 G Tuohy'sneedle, catheter fixed at 10cm mark at skin for postoperative pain management, anaesthesia induction was done by administering intravenous fentanyl 50 mcg, propofol 100 mg, atracurium 50 mg and patient intubated with no 8.5 cuffed ETT. Leftinternal jugular vein (IJV) was then canulated under USG guidance with 7 fr triple lumen then, CoopdechTM endobronchial blocker was passed through the oral endotracheal tube and was positioned appropriately in the left main bronchus using a paediatric bronchoscope, the balloon of the bronchial blocker was inflated with 4 mL of air and correct positioning was confirmed with paediatric bronchoscope. Left lung isolation was confirmed by absence of air entry on auscultation on left side then patient was given right lateral position and the location of endobronchial blocker was reconfirmed with Paediatric FOB. During the video assisted thoracoscopic surgery, left lung was completely deflated and one-lung ventilation was maintained with a tidal volume of 4-5 mL/kg with peak airway pressures below 30 cm H20, and a Positive end-expiratory pressure (PEEP) of 5cm H2O.

General anaesthesia was maintained with air-oxygen-desflurane mixture (MAC between 0.8- 1) and a continuous infusion of atracurium, intermittent boluses of fentanyl were used as analgesic. With good left lung deflation, video assisted thoracoscopic radical left upper lobectomy started but during surgical resection attempt were made to staple the bronchus, however, there was no plane between the bronchus and main pulmonary vessels thus decision was taken by surgical team to convert to postero lateral thoracotomy. There was excessive bleeding while trying to separate the mass from the Left upper lobe bronchus and Common Pulmonary Artery, there was around 2lit blood loss intraoperatively which was replaced with 1500ml colloid (gelofusine) till blood was available followed by 3 packed cells (870ml)were then transfused, Inj Noradrenalin 2mg/50ml Normal saline was stated and titrated between 0.05 to 0.22 mcg/kg/min. A complete Haemostasis achieved post radical lobectomy, ABG at the end of surgery showed respiratory acidosis with hypokalaemia K 3.1 and blood glucose was 304 hence potassium correction and Insulin infusion started for sugar control, post left radical upper lobectomy both lungs were then inflated to rule out any leak and normal two lung ventilation was then started, total operative time was 6 hrs with total intake 3.5lit crystalloids, 1.5 lit colloid and 870ml packed cells , total blood loss was 2lit and urine output was 1200ml. Considering old age, prolong duration of surgery and one lung ventilation with massive blood loss and vasopressor support (Noradrenalin infusion 0.06mcg/kg/min) decision was taken to sedate the patient and ventilate him overnight, hence fentanyl 4mcg/ml and midazolam 0.5mg/ml sedation mixture started for overnight sedation, next day morning sedation was stopped patient was gradually weaned of ventilatory support and epidural infusion 0.1% levobupivacaine + fentanyl 1mcg/ml started 5ml/hr two hours before extubation followed by this patient was successfully extubated and he complained of minimal pain at operative site Visual analogue scale (VAS 2/10) post extubation hence along with continuous epidural infusion patient also received inj paracetamol 1gm 6hrly and inj tramadol 50mg in 100ml ns twice a day, patient was comfortable with thoracic epidural and iv analgesics, patient had one episode of atrial fibrillation with fast ventricular rate in ICU post-operative day (POD 1) which was corrected with iv inj. Amiodarone 150mg bolus and then tab Amiodarone200mg was started for same, along with tab Meteprolol 25mg BD started, patientreceived inj clexane s/c 0.4mg od for thromboprophylaxis along with DVT stockings, patient received 1prbc each on POD2 and POD3 also Inj albumin 20% infusion started at 100ml per day for 5days from

pod3 in view of drop in serum albumin to 2.4mg/dl, rest of the post-operative course was uneventful and patient discharged on POD 10 after cardiologist reference who started tab Apixaban 2.5mg twice a day for thromboembolismprophylaxis along with tab metoprolol 25mg bd for rate control.

DISCUSSION

In lung cancer patientsundergoing evaluation it'sobserved that there is direct association between the number of pulmonary segments resected and future/subsequent risk of perioperative morbidity and mortality. With more and more resection in pulmonary segments mortality increases exponentially so after only segmentectomy mortality is less compare to that ofafter lobectomy but after pneumonectomy mortality is almost twice compare to post lobectomy [(2)] by limiting amount of pulmonary tissue resection we can minimise risk of postoperative physiological impairment. In case of patients with locally advanced carcinoma lung may be given chemotherapy preoperatively before being posted for surgical excision, post chemotherapy it's observed that DLCO decreases by almost 10 to 20% irrespective of noticeable improvement seen in spirometry values[(3)]. Chemotherapy drugs causing structural lung damage has been associated with increased post pulmonary complications hence it is recommended to repeat the pulmonary function test along with DLCO post neoadjuvant chemotherapy to re-evaluate the surgical risk after potentially damaging lung tissue [(4)]. In our case patient received 3 cycles of neoadjuvant chemotherapy after that we repeated PFT along with DLCO which showed no significant changes hence we decided go ahead with surgery.

Considering current advances in surgical field thoracic surgeries has also become less invasive and video assisted or robotic assisted thoracic surgeries have now preferred over traditional open thoracotomy procedure, VATS is basically minimally invasive procedure in which multiple ports are created in hemithorax through which then laparoscopicinstruments are inserted for surgical procedure in place of traditional large thoracic incision making more and more incessant use one lung ventilation (OLV).The benefits of VATS include reduced postoperative pain and hospital stay, faster recovery and return to work along with lower risk of infection and less bleeding. For VATS various lung isolation approach are used to collapse the operative lung so as to provide maximal space for good exposure and surgical manipulation with resultant best outcome, various options available for lung isolation include double lumen tubes, endobronchial blocker, the uninvent tube (Fuji Corp., Tokyo, Japan) of which DLT is regarded as gold standard in achieving lung isolation along with CoopdechTM TM endobronchial blocker (we use Coopdech^{TM} Type A blocker) other option include EZ blocker (Teleflex Medical Inc., Research Triangle Park, NC, USA) which consists of 7fr Y shaped catheter with distal two extensions riding over carina so that as per requirement any lung can be selectively deflated. No matter which method is used for lung isolation, its necessary to use fibreoptic bronchoscope for correct placement of device to ensure adequate lung separation both after the device has been positioned and again after the patient has been positioned [(5,6)]. Though DLT is considered the gold standard in lung isolation when compared to bronchial blocker, there are always a few advantages and disadvantages. DLTS are considered best for lung isolation when the lung is contaminated with blood or pus because they provide complete lung isolation as well as suctioning of individual lung can be done throughout the entire surgery, which is not possible with blocker. Another advantage of DLT is that in the case of bilateral lung procedures, there is no need to replace or reposition the DLT. However, there are some disadvantages to using DLT, such as the fact that inserting a DLT is more difficult and skilful than inserting a single lumen tube (SLT), and that in ICU patients with insitu SLT, it is easier to insert a bronchial blocker for lung isolation. In the case of a procedure with DLT use, the chances of laryngeal oedema are higher, and it is always difficult to electively ventilate this patient post-operatively. A DLT increases the risk of airway injury, as well as hoarseness, vocal cord injury, tracheal or main stem bronchial injury and oesophageal injury [(6, 7)]. Bronchial blocker is another option for one lung ventilation, but it may not produce effective lung isolation in patients with severe obstructive disease or atypical bronchial anatomy [(8)]. In addition, the use of bronchial blockers is limited due to the inability to clear secretions, visualise the bronchial anatomy of the nondependent lung, and accurately deliver continuous positive airway pressure (CPAP) to the nondependent lung. There is also a high incidence of displacement during patient positioning when using bronchial blockers[(9)]. However, due to the high risk of airway trauma and other disadvantages associated with the use of DLT in our elderly and frail patients, we decided to use bronchial blocker despite the above-mentioned disadvantages. Placing bronchial blocker is easier than DLT, and in the event that post-operative ventilatory support is required, there is no need for tube exchange to SLT, reducing the risk of airway manipulation. To rule out blocker displacement, we performed paediatric FOB guided bronchial blocker placement in the left main bronchus and confirmed its position again after giving right lateral position.

Though lung isolation is one of the most important factors in thoracic surgery but at the same time the importance of well-planned pain management following major thoracic surgery for lung resection cannot be overstated.On the visual analogue pain scale, post-thoracotomy pain is the most intense of all surgical procedures.However, pain control is critical in both open thoracotomy and VATS procedures (though VATS is significantly less painful) to avoid postoperative complications caused by patients splinting expiratory muscles.Patients who are in severe pain after surgery will have a low respiratory effort and a lower functional residual capacity. Coughing and clearing secretions will also be difficult for the recovering patient. These pulmonary complications will lead to airway obstruction, atelectasis, shunting, and tissue hypoxia [(10)]. For control of post thoracotomy pain continuous infusion via thoracic epidural catheter is considered as gold standard as it has been shown to provide best analgesia not only at rest but also during patient movement maintaining the highest level of patient satisfaction [(11)]. A thoracic epidural not only provides excellent analgesia throughout post-operative period but at the same time it also significantly reduces intravenous use of opioids for pain relief, potentially lowering the incidence of pulmonary morbidity [(12)]. Furthermore, epidural analgesia is linked to a lower need for rescue analgesia. Hypotension, bradycardia, urinary retention, incomplete (or failed) block, neurological injury, and, in rare cases, paraplegia due to epidural hematoma are all limitations of TEA. Furthermore, in patients who are at risk for cardiovascular complications, the resulting hypotension with epidural analgesia must be carefully managed [(12, 13)].

Opioids are an important component of treatment regimens and can be given in a variety of ways. Intravenous patient-controlled analgesia (IV PCA) is the most basic and widely used method of postoperative pain management [(11)]. The use of IV PCA is ideal for striking a balance between comfort and respiratory depression. Parenteral narcotics, on the other hand, pose a challenge in patients with poor lung function and must be carefully titrated. Sedation can also increase the risk of pulmonary complications like respiratory depression, sputum retention, and infection [(14)]. After through discussion with surgical team we decided to put thoracic epidural as it is considered best for post thoracic surgery pain also in case VATS gets converted to open thoracotomy it will provide excellent pain relief minimising post-operativepulmonarycomplications as with working epidural patients will get good pain relief resulting in good compliance with incentive spirometry, chest physiotherapy and early mobilisation out of bed all resulting in early recovery and excellent post-operative outcome, we gave continued epidural infusion with 0.1 % levobupivacaine + 1mcg fentanyl at 5 ml/hr via epidural catheter placed at T6 T7 level till POD7 along with iv analgesics like paracetamol. To summarise thoracic epidural along with use of SLT and the Coopdech^{TM} endobronchial blocker,passed along with paediatric bronchoscope for confirmation of its correct placement in left main stem bronchus to achieve one-lung ventilationand with working thoracic epidural for post-operative pain managementresults in minimal post-operative pulmonary complications and excellent perioperative outcome.

CONCLUSION

Thoracic surgeries for lung resection are extremely complicated, requiring a collaborative effort from the surgeon, anaesthesiologist, pulmonologist, and other specialists to determine the best therapy based on an individual's presentation, comorbidities, and risk stratification. Preoperative evaluation of the patient along with the intraoperative anaesthetic management, and excellent postoperative analgesia are all critical components for ensuring the best possible care and outcome for the patient.

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