

Thoracoscopy with VATS and Decortications



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Introduction

A 29-year-old male weighing 79 kilograms and 73 inches in height came into the emergency room as a trauma patient involved in a motor vehicle collision. The patient initially presented with a traumatic brain injury with agitation, renal failure, multiple right rib fractures, pulmonary lacerations, right hydropneumothorax, and pulmonary contusion. A tracheostomy was performed to secure the airway, and a blood transfusion was initiated to maintain homeostasis.

Before the thoracoscopy, an open reduction internal fracture procedure was performed on the mandible and maxilla, along with gingival closure, upon presentation to the operating room for the proposed thoracoscopy with possible VATS and decortations. During the review of the patient's MRN, it was established that the patient had a peanut allergy; his ASA status was category three. Additionally, it was determined that the patient would be a difficult airway due to the concomitant trauma processes.

Intraoperative

The patient's comorbidities and ASA three status required an intricate anesthetic plan. The patient's tracheostomy was also taken into consideration for the induction process. General anesthesia was the technique chosen, and an arterial line was placed for those reasons.

The proposed procedure indicated the use of a double-lumen tube. Double-lumen tubes are utilized for one-lung ventilation and lung isolation. As a technologist, it is essential to have multiple double-lumen tubes available for the induction along with the Glidescope. According to Guimaraes (2019), "Height, gender, age, body habitus, and ease of

insertion are all important considerations when choosing an appropriate size for a DLT" (Guimaraes, 2019, p. 416). When considering double-lumen tube sizes for this case, the patient's height and weight were the primary considerations. This patient's height indicated that either a left 37 french or a left 39 french would suffice without causing damage to the trachea or the carina. A 35 french and 41 french left double-lumen tube was also on standby.

Preparing the DLT for use is an essential process for the technologist. Adding lubricant to the stylet and inserting the stylet on the bronchial side will prepare the tube for seamless intubation. It is also essential to have the DLT connector assembled before the intubation. A mayo stand with a Williams airway, in case of failed DLT placement, is helpful for fiberoptic confirmation of a single lumen tube; also, having a swivel adapter prepared, a 10-cc syringe filled with local anesthetic and an LTA to numb the airway, tracheal suction catheters, an occluding device to clamp the proximal bronchial tube, and lidocaine jelly is helpful. Placing a double-lumen tube is a three-step process. The first step after inserting the tube is to ensure that bilateral ventilation is possible by inflating the tracheal side and creating a seal without causing damage to the trachea. The next step is to connect a reservoir/Ambu bag and clamp the bronchial lumen, then deliver one breath into the tracheal lumen. If bilateral breath sounds are heard, and chest rise is visible, the tracheal lumen is inflated adequately, and bilateral ventilation will be possible. The second step to verifying correct placement is to inflate the bronchial cuff, connect the Ambu bag to the tracheal lumen, and deliver a breath. If unilateral breath sounds and chest rises are heard and seen, it can be said that the double-lumen tube is correctly placed. The final step is confirming that ventilation of the downed lung is possible by having both cuffs inflated, delivering a breath from the Ambu bag, listening to the downed lung side, and hearing breath sounds. The Glidescope was set up and readily available because it was the primary way of confirming the double lumen tube placement in the trachea and bronchial, especially after repositioning the patient for the VATS procedure and

decortications. "Using fiberoptic bronchoscope through the bronchial lumen and guiding the DLT over fiber-optic scope increases the accuracy of placement" (Bora, 2020, p.4).

Once the double-lumen tube placement was confirmed, an arterial line was placed for real-time arterial blood pressure. The technologist is responsible for gathering tape, a guidewire, a tourniquet, extension tubing, chlorhexidine prep, an arterial line catheter, and the ultrasound with a linear probe. Prepping the area on the patient and taping the patient's hand in place is also helpful to the anesthesia provider for arterial line placement. Concluding arterial line placement, the patient was placed lateral, and the double lumen was checked with the fiberoptic bronchoscope ruling out tube migration and reaffirming placement confirmation.

VATS Procedure

"Video-assisted thoracic surgery refers to endoscopically assisted direct, robotic, and other minimally invasive techniques for thoracic surgery" (Jaffe, 2020, p. 309).

The patient's diagnosis of pulmonary lacerations, hydropneumothorax, and pulmonary contusions indicated a VATS procedure. In order to perform the VATS procedure, several small incisions are made on the lateral aspect of the patient. The first incision is for the placement of a video thoracoscope, allowing the surgeon to view where the potential problems are inside the lung. Once the etiology is

confirmed, other small incisions are made to insert instruments into the chest cavity. This case was performed under general anesthesia, and the double lumen placed successfully collapsed the operative lung. Jaffe states, "Lung collapse is slower than with thoracotomy because the chest cavity is not completely opened to atmospheric pressure" (p. 311). It is suggested to start one lung ventilation early and use a FiO₂ of 1.0 while applying suction

to the unventilated lung. Carbon dioxide sufflation can be utilized to speed up this process even further, but there is a risk of a venous gas embolism. Sudden insufflation can increase intrathoracic pressure and cause hypotension, low heart rate, and hypoxemia; therefore, carbon dioxide

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(Kumar, 2020)

insufflation should be introduced slowly. For maintenance of general anesthesia, volatile gas should be maintained at 0.6 to 1.0 MAC, and it is recommended to consider analgesia infusion.

Decortications

The indications for decortication include pleural empyema, hemothorax, and pleural thickening due to inflammatory conditions. Contraindications include severely diseased lungs, bronchial stenosis, and hemodynamic instability. Pleural thickening was discovered during the VATS procedure. "VATS-decortication is usually performed via an anterior approach... A 30 degrees camera is used for visualization during the procedure" (Kumar, 2020).

According to Kumar, "The rind or the pleural peel must be removed from the lung parenchyma, including the fissures" (p. 3). After the removal, the surgeon instructs the anesthesiologist to inflate the downed lung to determine any air leaks in the pleural space. Any leaks must be sutured closed, and another leak test must be performed to ensure the lung is fully closed. After successful testing is complete, hemostasis must be insured. An intercostal drain is inserted into the thoracic space; in this case, the surgeon placed two. One anteriorly and one posteriorly, and they must "remain in place until the appearance of signs (clinical and radiological) of lung expansion" (Kumar p. 4). A layered chest wall closure is then implemented to conclude the procedure.

During the procedure, the patient consistently became bradycardic with a low MAP. As the technologist, the machine was the first thing inspected. During the diagnostic phase, it was noted that the WAG and scavenging line needed adjustments. The provider asked the surgeon to stop temporarily so that they could bilaterally ventilate the patient; during this process, phenylephrine was administered to address a transient drop in blood pressure.

Postoperative

After the completion of the procedure, we exchanged the patient's tube using a tube exchange to reintubate with a standard ETT. Once transported to the gurney, we took the patient to the ICU. We were particularly attuned to the patient's chest tubes during this process. Moving the patient to the transport bed and transportation to the ICU was slightly difficult because of the patient's chest tubes and intubation. Otherwise, the transport was uneventful, and the transfer of care was smooth.

Conclusion

The VATs procedure is a multifaceted procedure used to treat various pulmonary pathologies and trauma. In this patient's case, the VATs procedure was indicated for removing fibrous tissue and continued repair of lacerated tissue resulting from trauma—the procedure required invasive hemodynamic monitoring, including arterial line placement. For patients undergoing VATs, the anesthesia care team must adequately prepare and place the double-lumen tube for one-lung ventilation. Ensuring ventilation was successful includes isolating the lung and verifying the placement of a fiberoptic bronchoscope. It is essential that the scope remains in the room to monitor for tube placement and endobronchial extubation. Ultimately the management of this patient was successful, and we transported the patient to the ICU for continued postoperative care. 

References

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Continuing Education Quiz

To test your knowledge on this issue's article, provide correct answers to the following questions on the form below. Follow the instructions carefully.

1. What oral adjunct is useful in events of failed DLT?
 - a. Williams airway
 - b. Oral Rae
 - c. Nasal Rae
 - d. Nasal Cannula
2. What increases the accuracy of DLT placement?
 - a. Glidescope
 - b. Fiberoptic Scope
 - c. McGrath
 - d. ETT placement prior to DLT
3. Lung collapse during a VATs procedure occurs rapidly.
 - a. True
 - b. False
4. What Gas can be utilized to increase lung collapse for the VATs procedure?
 - a. Sevoflurane
 - b. Nitrous Oxide
 - c. Carbon Dioxide
 - d. Desflurane
5. What is the risk of sudden thoracic insufflation?
 - a. Hypertension
 - b. Hypotension
 - c. Tachycardia
 - d. Bradycardia
6. What are the indications for decortication?
 - a. Bronchospasm
 - b. Neoplasm
 - c. Subdermal hematoma
 - d. Hemothorax
7. What position is utilized for the VATs procedure?
 - a. Supine
 - b. Lateral
 - c. Prone
 - d. Lithotomy
8. Height is not considered when sizing a DLT.
 - a. True
 - b. False
9. What is the risk of rapid CO2 Insufflation?
 - a. Venous gas embolism
 - b. Bronchospams
 - c. Hemothorax
 - d. Neoplasm
10. What is done after decortication of the lung?
 - a. Reinflation of lung to check for leaks
 - b. Downing of lung to repair

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