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Case Report

A Novel Approach: Use of a PTBD Catheter for Lung Isolation in a Pediatric Patient

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Abstract

One lung ventilation in children is challenging and requires precision and experience. Various techniques have been used over decades. The adaptability of a percutaneous biliary drainage catheter for one lung ventilation in pediatric thoracoscopic surgery, highlighting a practical solution for airway management scenarios.

Keywords: One Lung Ventilation; PTBD Catheter; Pediatric

Introduction

One lung ventilation is a critical component of thoracic surgery, enabling surgeons to operate in a still bloodless field requiring precise and delicate techniques to ensure optimal outcomes. However, achieving effective lung isolation in pediatric patients poses unique challenges due to their smaller airway diameters and limited respiratory reserve.

We report a unique case of a pediatric patient who underwent thoracic surgery requiring one lung ventilation. Due to the unavailability of traditional bronchial blockers, PTBD catheter was repurposed as a novel solution for lung isolation, demonstrating the importance of resourcefulness in anaesthesia care, highlighting the possible benefits and limitations of this novel approach.

Case

A 10 year old male patient weighing 22 kg, known case of down phenotype with B-Cell Acute Lymphoblastic Leukemia day 41 of chemotherapy induction (Vincristine) with fungal pneumonia with history of high grade fever, cough and chest pain was admitted and was on oxygen support via nasal prongs at 2 litres/min. Ct chest was suggestive of right sided organised empyema with underlying lung collapse of middle and lower lobe, so was planned for right VATS decortication.

In pre-anaesthetic evaluation, the patient's detailed medical history was taken. Patient had a history of delayed developmental milestones and no congenital heart disease. On examination, patient had pallor, petechiae all over body, pedal oedema, cervical lymphadenopathy, palpable liver and spleen, thoracic kyphoscoliosis and decreased air entry on right side on auscultation. Airway examination revealed facial puffiness, flat nose, high arched palate, Mallampati grade II and bucked tooth. Pig tail catheter on right side for intercostal drainage was in situ. Vitals were stable and preoperative laboratory results revealed elevated liver enzymes (ALT 246 U/L, AST 273 U/L), hemoglobin of 8.5 gm% and hypoalbuminemia 2.5 mg/dl.

After following ASA standard monitoring protocols and inducing general anaesthesia with fentanyl, propofol and atracurium,

a size 6.5 cuffed endotracheal tube was inserted and patient was ventilated using a Drager anaesthesia machine. Due to unavailability of appropriate size of traditional bronchial blockers, a 12 Fr 30 cm long PTBD catheter was selected and inserted intraluminally through the endotracheal tube. Using fibreoptic bronchoscopy, the catheter was guided into left main bronchus and the cuff was inflated with 1.5 ml of air to achieve lung isolation.

The patient remained hemodynamically stable throughout the procedure with no problem of oxygenation or ventilation. The surgery got accomplished without complications and the catheter was removed after proper suctioning at the end of surgery. Uneventful extubation with complete recovery occurred and patient was shifted to ICU for monitoring.

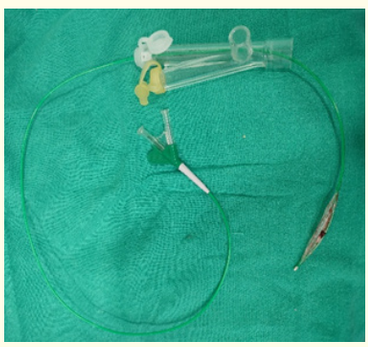

Figure 1: PTBD catheter.

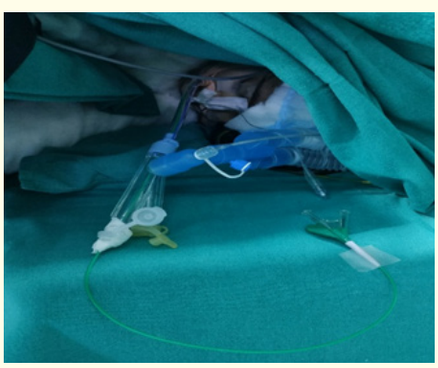

Figure 2: Patient in lateral position.

Discussion

OLV in pediatric patients is more demanding and complex than adults due to its anatomic and physiological variations. Gahren., *et al*. showed that majority of the patients, particularly children because of intolerance, needed two-lung ventilation for VATS. Advances in pediatric anaesthesia and thoracic surgery are expanding the possibilities for OLV in children enabling more complex procedures and good patient outcome.

Traditional bronchial blockers as Arndt blocker, Fogarty catheter, Cohen blocker are widely used for OLV in children with several challenges like difficulty navigating anatomy, limited visibility and versatility, risk of malposition, kinking/bending.

In our case, use of PTBD catheter as a bronchial blocker is a novel approach that highlights the importance of resourceful solutions in anaesthesia care. The PTBD catheter provided effective lung isolation providing the surgeon a bloodless still field. It was easy to place even in a pediatric patient with a small airway diameter. Smaller size and flexibility may reduce the risk of airway trauma, may be more cost effective than traditional bronchial blockers especially in resource limited settings.

However, the use of a PTBD catheter is not a standardized technique and patients with certain anatomical or physiological variations as tracheal stenosis, respiratory depression may not be suitable for PTBD placement. It may still carry a risk of airway trauma especially if not carefully secured, may migrate out of position compromising lung isolation and requiring repositioning.

Further research is needed to standardize the technique of PTBD catheter placement for OLV and establish clear guidelines for its use. It may be applicable to other patient populations such as adults with difficult airways [1-5].

Conclusion

In conclusion, our experience using a PTBD catheter for lung isolation in a pediatric patient with down phenotype and B-ALL undergoing VATS decortication highlights the importance of flexibility and innovation in anaesthesia care. Future studies are needed to further evaluate the safety and efficacy of this novel technique.

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