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THE FOGARTY EMBOLECTOMY CATHETER AS A BRONCHIAL BLOCKER IN A CASE OF ATRIAL SEPTAL DEFECT REPAIR WITH MINI THORACOTOMY APPROACH

Anaesthesiology

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ABSTRACT

Atrial septal defects are repaired through a median sternotomy under general anaesthesia and cardio pulmonary bypass. Now a days mini thoracotomy approaches like right antero lateral or right limited posterior thoracotomy are practiced to repair ASD. Anaesthetic management for ASD repair through mini thoracotomy is similar to any other cardiac surgical procedures except tracheal intubation, which is usually done with left sided double lumen tube of appropriate size to collapse right lung and to improve surgical exposure. Lung isolation with double lumen tube is the commonest technique performed, but It's difficult to use double lumen tube in situations like altered airway anatomy, patient with tracheostomy, patient with small bronchus and pediatric patients. So bronchial blocker remains the technique of choice in pediatric patients whose bronchi is too small for the smallest double lumen tube[3]. In our case we experienced difficulty to place the left double lumen tube of 28 size in position. So we used 6Fr Fogarty embolectomy catheter as a bronchial blocker[1]

KEYWORDS

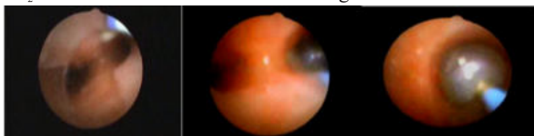
Fogarty embolectomy catheter, bronchial blocker, fiber optic bronchoscope (FOB), single lumen tracheal tube (SLT),

CASE REPORT:

A 13 year old girl weighing 35 kg, posted for ASD closure. The patient had history of recurrent respiratory tract infections. The patient's general conditions were fair. On precordial auscultation an ejection systolic murmur was heard over second left intercostal space. ECG revealed normal sinus rhythm, chest X ray with normal lung fields. All laboratory investigations were within normal limits. Echocardiography revealed 20 mm ostium secundum type of ASD with left to right shunt, normal left ventricular systolic function.

In operating room, patient was positioned supine. With standard monitors, under strict aseptic precautions, right internal jugular vein was cannulated with 7Fr triple lumen central venous catheter and left radial artery was cannulated with 20 gauge arterial cannula. CVP and invasive blood pressure monitors were connected. Patient was premedicated with inj.Glycopyrrolate 4 µg/kg IV, inj.Fentanyl 2 µg/kg IV and preoxygenated with 100% oxygen for 3 minutes. Anaesthesia induced with inj.Thiopentone sodium 5mg/kg IV, Paralysed with inj.Vecuronium 0.1 mg/kg IV. We tried intubation with 28 sized left double lumen tube; even after couple of attempts we experienced difficulty to place the tube in place. Since we didn't have bronchial blockers, we used 6Fr Fogarty embolectomy catheter as a bronchial blocker for lung isolation[1].

A 6Fr, 80 cm Fogarty embolectomy catheter was lubricated with lignocaine jelly and inserted through glottis under direct laryngoscopy[2]. Trachea was then intubated with 6.5mm ID cuffed single lumen tracheal tube and 3 mm fiber optic bronchoscope was introduced into single lumen tracheal tube (SLT) to facilitate placement of the Fogarty catheter into right bronchus. With deflated Endotracheal tube cuff, Fogarty catheter was negotiated by the side of endotracheal tube, and successfully placed Fogarty catheter in right main bronchus and secured. After optimal placement of Fogarty balloon, endotracheal cuff was reinflated. Lung isolation was achieved by inflating Fogarty catheter balloon with 2ml of air. Lung isolation was confirmed by auscultation and inflated balloon position was confirmed with fiber optic bronchoscopy. Anaesthesia was maintained with sevoflorane 2%, mixture of oxygen and nitrous oxide 50:50. $ETCO_2$ was maintained between 28-32 mmhg.



Surgery proceeded through 5cm right antero lateral thoracotomy incision, after systemic heparinization aortic and venous cannulations (SVC and IVC) were done and cardio pulmonary bypass initiated. Total duration of surgery was two and half hours with bypass time of 60 mins. Intraoperative period was uneventful. After the procedure patient was weaned from cardiopulmonary bypass successfully. The Fogarty was removed and Patient shifted for elective post-operative mechanical ventilation.

DISCUSSION:

Lung isolation in patients coming for cardiothoracic surgery remains a challenge for anaesthesiologist. The techniques used for lung isolation are intubation with double lumen tube, end bronchial intubation with single lumen tracheal tube, and bronchial blockers. Among those techniques, lung isolation with double lumen tube is the commonest. It's difficult to use double lumen tube in situations like altered airway anatomy, previous airway surgeries, patient with tracheostomy, patient with small bronchus and pediatric patients. Endobronchial placement of single lumen tracheal tube has many disadvantages[2] such as difficult to know the depth of insertion relative to carina, tracheal tube is too short for nasotracheo bronchial intubation, unable to suction or pass fiber optic bronchoscope to contralateral lung, unable to administer CPAP. Endobronchial intubation with tracheal tube is considered as an emergency lifesaving manoeuvre[3]. So bronchial blockers remains the technique of choice in pediatric patients whose bronchi is too small for the available double lumen tube[3].

Though Fogarty catheter is a device designed for vascular embolectomy, there are well documented reports[1] of its use as a bronchial blocker in one lung ventilation. In our case we used 6Fr, 80 cm Fogarty catheter as bronchial blocker for lung isolation to improve surgical exposure. Fogarty catheter consists of a hollow tube with an inflatable balloon at its tip. It has a stylet that can be preshaped[1,2] at the distal end to facilitate its guidance into the preferred bronchus. The tip is soft since stylet ends little proximal to the tip. The Fogarty occlusion balloon is considered as high pressure and low volume cuff, can be inflated with either saline or air[4]. For 6Fr catheter inflated balloon diameter is 13 mm with maximum liquid capacity of 2cc and maximum gas capacity of 4.5cc[4]. The advantages[1] of using fogarty catheter in one lung ventilation are, it can be placed through the lumen of single lumen endotracheal tube, can be used as selective lobar blocker, can be used as double endobronchial blocker, can be used in patients with small bronchus, can be used in tracheostomy patients requiring one lung ventilation, can be used nasotracheally along with single lumen endotracheal tube where oral intubation is impossible. But fogarty catheter is a vascular device not designed for one lung ventilation, it is made up of natural rubber latex[1] so can't be used in patients with history of latex allergy, there is no communicating channel in the center so neither suction nor oxygen insufflations can be done, though it has stylet there is no guide wire device so it cannot be coupled with fiber optic bronchoscope, An air leak from the breathing circuit can be a common problem, specifically when the Fogarty catheter is placed inside the single-lumen endotracheal tube, the soft tip of Fogarty catheter can be included in stapling line during lobectomy.

Apart from hypoxemia, a potential problem with this technique is displacement of the Fogarty balloon into trachea which may blocks ventilation to both lungs. Since the Fogarty balloon is high pressure and low volume type[1], over distention can rupture the airway[1]. Though the tip of the Fogarty catheter is very soft, forcing the introduction of a Fogarty with the stylet in place can carry the risk of airway rupture.

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CONCLUSION:

Though the Fogarty catheter has its own disadvantages as a bronchial blocker, it can be used as an alternative to double lumen tube for lung isolation in patients where double lumen tube placement is difficult. It is important to emphasize that positioning and intra-operative correction of malpositions of Fogarty catheter are managed best with the use of fiber optic bronchoscopy.

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