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PAEDIATRIC FOREGUT DUPLICATION CYST –A HERCULEAN CHALLENGE FOR ANAESTHESIOLOGIST

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ABSTRACT Mediastinal foregut duplication cysts are rare entities. The location of this cyst results in most of the inherent complications. We review the anaesthetic management of surgical excision of such a cyst via video assisted thoracoscopy (VATS) along with paediatric lung isolation strategies and report the usage of one such modality for VATS.

KEYWORDS : Mediastinal foregut duplication cyst, Paediatric, VATS, One lung ventilation

INTRODUCTION

Anaesthetic management of mediastinal foregut duplication cyst is a challenge to the anaesthesiologist. It often produces mass effects leading to significant haemodynamic disturbances, respiratory compromise andgastrointestinal aspiration.

Surgical excision through conventional open approach or through VATS is the treatment of choice for thisentity. Thoracic surgery with intraoperative lateral positioning and lung isolation, increases the perioperative risk.Extensive pre operative evaluation and optimisation tends to minimize peri operative morbidity and mortality.

Case Report:

A 9 years old male child weighing 20 kgs was incidentally diagnosed with right paratracheal mediastinal cyst. Patient had a history of recurrent URTI with multiple hospital admissions. Currently the patient presented with complaints of respiratory discomfort and was diagnosed with pneumonia. X-ray chest incidentally revealed an upper lobe cystic lesion. On further evaluation CT scan reported 3*5*2.5 cm cystic para-tracheal mass. Physical examination and other investigations were within normal limits. Decision to excise the cyst was made in view of probable rupture leading to infection and mediastinitis and possible malignant transformation.

After informed consent and counselling patient was wheeled in for surgery. Monitors including ECG, NIBP and SpO2 were attached. A 22 G i.v. cannula was secured. Prewarmed intravenous fluid was started. After preoxygenation,general anaesthesia was induced withi.v. fentanyl 40 mcg, i.v. thiopentone 100 mg in titrated dose followed by i.v. inj. vecuronium 2 mg. Trachea was intubated with 4.5 FG uninvent tube and right sided lung was isolated by bronchial blocker under flexiblebronchoscopicguidance. The bronchial blocker cuff was inflated at the level of right upper lobe bronchial orifice. There was difficulty during placement of bronchial blocker in right bronchial lumen due to short length between carina and origin of right upper lobe bronchus. Multiple attempts to place bronchial blocker in right bronchial lumen was leading to its displacement either distally beyond right upper lobe bronchus or proximally in tracheal lumen. This problem was circumvented by inflating the cuff over bronchial orifice resulting in herniation of the cuff in right upper bronchial lumen thus sealing it. Simultaneously it helped in anchoring and stabilizing the bronchial blocker firmly even with the change of position.

After left lateral position the placement of bronchial blocker and right lung deflation was reconfirmed under bronchoscopic guidance. Anaesthesia was maintained with 100% O_2 +1.2% Isoflurane. N_2O was avoided to prevent inflation of cyst. Vitals were monitored using ECG, SpO2, $EtCO_2$, temperature charting, urine output and intermittent arterial blood gas analysis intraoperatively. The cyst was removed by VATS. Owing to collapsed lung, low flow (0.5-1.0 L/min) and low pressure(5 cm of water) was needed for the procedure. A 2.5 cm × 3 cm cyst was excised, leaving back a portion of cyst wall to avoid a rent in oesophageal mucosa. Any possible rent in oesophageal wall was ruled out by looking for presence of air leak at the surgical site. Surgery lasted for 2 hours and was concluded with placement of an ICD and a surgical drain. Thoracoscopy port sites were infiltrated with .25% bupivacaine. The bronchial blocker was deflated and pulled back. The patient was turned in supine position and trachea was extubated after lung expansion. In the post operative period, patient was haemodynamicaly stable and ABG was normal. Histopathology confirmed the diagnosis of foregut oesophageal duplication cyst. Patient resumed oral feeds by day 3 and was discharged on day 5 of surgery.

DISCUSSION:

Foregut duplication cyst is a rare congenital anomaly resulting from aberration of the posterior division of embryonic foregut.[1] Embryologically, trachea & oesophagus separate at 5th week of gestation from the ventral wall of foregut.Mucosal alterations at this stage leads to cystic malformation.They can affect any portion of gastrointestinal tract. Ileum beingthe most common location followed by esophagus.[2]

The reported incidence of these cysts is 1:100 000, with approximately 70% to 75% cases found in the paediatric population.Esophageal duplications make between 0.5-2.5% of them[1].[3]80% of children are symptomatic. Clinical presentation may be variable, the most common complaints being dysphagia, stridor, hematemesis,epigastric discomfort and retrosternal pain.[4]Anomalies like VACTERL, spina bifida, cardiac deformities can also be associated.[5]

The conventional treatment for these cysts is surgical excision to avoid potential catastrophic complicationslike infection, rupture, malignant transformation later in life.[6]Open thoracotomy via posterolateral approach has been the standard practice for excision however minimal access surgery through video-assisted thoracoscopy(VATS) has been a preferred modality provided the expertise and infrastructure are available.[7,8]Better post op analgesia, early recovery, reduced hospital stay result in superior outcomes in VATS.[9]

Lung isolation is desired in thoracic surgery to avoid contamination of the healthy lung, provide adequate ventilation and better surgical access especially during thoracoscopy. In paediatric lung isolation, the 'ABCD' - anatomy, bronchoscopy, chest imaging and diameter of the paediatric airway with age needs to be considered.Varying dimensionsof paediatric airway with age and size limitations of each lung isolation device available poses a challenge to paediatric anaesthesiologists.

Techniques for single-lung ventilation in children include use of a double-lumen tube (DLT), balloon-tipped bronchial blockers like Arndt or Fogarty blocker and a Univent tube. Amongst the gamut of devices mentioned, only an appropriate sized Univent tube was available in our set up.

Univent tube[Fig.1] is a conventional TT, available in two sizes, 3.5 and 4.5 mm ID, with bronchial blocker (OD 2mm) in a separate lumen within the main lumen[10]Cases reporting the usage of Univent tube in paediatric age group are rare. The problem encountered by us during the placement of the same could have been due to undersized Univent tube or shorter distance between carina and right upper lobe bronchus. We overcame this difficulty by manoeuvring the tube as discussed.

Further evaluation regarding use of Univent tube in paediatric population will be required to know the probable cause of this difficulty.

CONCLUSION:

Size limitation of lung isolation devices is a challenge to paediatric anaesthesiologists.Availability and skill in the same needs to be ensured for a successful outcome .

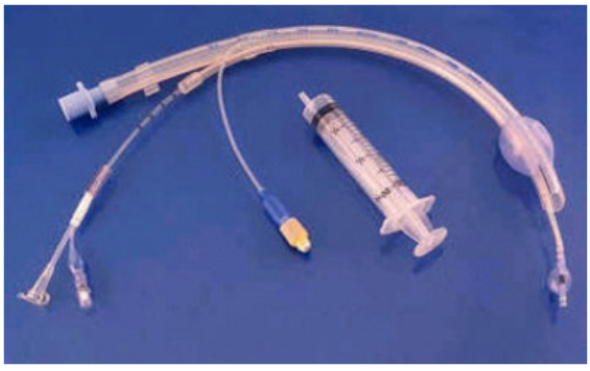

Fig. 1- Univent Tube

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