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A CASE SERIES OF SUCCESSFUL ANAESTHETIC CONSIDERATIONS IN PAEDIATRIC THORACOTOMIES

Anaesthesiology

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ABSTRACT

Congenital pulmonary airway malformation CPAM, previously known as congenital cystic adenomatoid malformation of lung. CCAM is a rare congenital pathology of lung which occurs as a result of insult in early intrauterine period of life 7th week leading to abnormal development of tracheobronchial tree of lung. Its incidence is 1:25000 to 1:35000 live births and represents up to 25% of congenital lung abnormalities. It is usually associated with pulmonary hypoplasia and pulmonary HTN. Any lesion with an abnormal connection to the tracheobronchial tree, in particular CLE and some cases of CPAM, is at risk of progressive distention with ventilation due to a ball valve effect within the diseased area, with deleterious effects on both the surrounding lung parenchyma and the major structures of the thorax necessitates. Therefore, it is crucial that the expected behavior of the lesion be determined prior to the induction of anesthesia. Additionally, the preoperative evaluation of these patients should also recognize an elevated incidence of comorbid anomalies, including up to 20% for CHD in patients with CLE, and CDH in 20%–30% of patients with EPS. Induction of anesthesia should maintain spontaneous ventilation if there is any concern over a potential ball valve effect, until either the contralateral lung is isolated with OLV, or the hemithorax is opened. An inhalational technique is often preferred, but carefully titrating a combination of intravenous medications may be possible as well. If the review of the anatomy and the lesion show that positive pressure ventilation will be tolerated, the induction of anesthesia can be followed by the administration of a neuromuscular blocking agent. CPAM is one of the more common congenital lung malformations and consists of tissue with cystic, solid, or mixed components that communicates with the normal tracheobronchial tree, but does not participate in gas exchange. Incidence of TEF is 1:3000 to 4500 of live births which is a congenital anomaly of esophagus & trachea that manifests within first few hours to days of life. The commonest defect is esophageal atresia with distal TEF (type C/IIIB as described by Gross &Vogt). It is considered a surgically correctable anomaly of the gastrointestinal and respiratory system and continues to be a major challenge in neonatal surgery. However with surgical repair, the rate of survival exceeds 90%, even in infants with a low birth weight. Anesthetic management of TEF are many like consideration of poor organ development/ prematurity, difficult airway ,negotiation of endotracheal tube beyond the fistula, cardiorespiratory compromise, maintenance of oxygen saturation with adequate depth of anaesthesia, perioperative analgesia and postoperative intensive care. Multidisciplinary approach, Congenital lobar emphysema (CLE) is a rare developmental lung malformation that is defined as the hyperinflation of one or more pulmonary lobes due to partial obstruction of the bronchus from any one of a number of causes. Almost half of patients are symptomatic at birth with varying degrees of respiratory distress, and the remaining half usually present within 6 months of life. The left upper lobe is most commonly affected, These lesions are at particularly high risk of progressive over inflation secondary to a ball valve effect. In the perioperative period, this is of concern during positive pressure ventilation,

KEYWORDS

Thoracotomy, paediatric anaesthesia , CPAM, Tracheooesophageal fistula , Empyema, Pyopneumothorax, One lung ventilation, Double lumen tube

Case-1:
A 2.5kg male child born via normal vaginal delivery at 9 months of gestation presented with shrill cry, difficulty in breathing and grunting, chest indrawing .

On examination:
HR-140bpm , SPO2-86%on room air. Air entry reduced more on right side than left.

CVS: Pan systolic murmur was heard.

The baby was resuscitated with bag and mask ventilation.

After resuscitating , the child was shifted to NICU and was decided to intubate.

On further investigations,

Chest Xray:
Multiple air filled cystic lesions, multiple septations causing mediastinal shift to left , these features are suggestive of CPAM.

HRCT Thorax:
Multiple large air filled intercommunicating cysts in thin septations noted in apical and right lower lobe. Largest measuring 3.9*2.8*3.9cm. Few subsegmental atelectasis present in postero-basal segment of right lower lobe. Mediastinal & tracheal shift present towards left with hyperinflation of rest of the lung parenchyma.

2D-echo:
Large Ostium secundum ASD with left to right shunt. Severe PAH , RVSP= 72mmHg.

The child was posted for Right portal Cystectomy.

Intraoperatively ventilated with minimal positive pressures without nitrous oxide to avoid cyst expansion.

Case -2
A 9month old male child born via normal vaginal delivery, had presented with complaints of fever with chills , cough with expectoration and cold since 10days.

On examination , HR- 130bpm, RR-50breaths/minute, SPO2- 88%on room air, Air entry was reduced on right lung field than left side .

Head circumference –38cm, Microcephaly.

CNS- tone was reduced on all four upper and lower limb. Power – 3/5 on upper and lower limb.

The child was started on 3 liter/ minute of 100%oxygen via nasal prongs. On further investigation,

HRCT Thorax:-
Mild right sided pleural effusion with multiple air foci and collapse and consolidation of underlying lung parenchyma. Large peripheral patchy areas of consolidation involving posterior segements of right lower lobe with well defined cystic areas with in the consolidation in antero basal segment of right lower lobe ? pneumatocoele. Areas of GGO involving superior and postero-basal segment of left lower lobe.

The child was diagnosed to have Severe Acute Malnutrition with microcephaly with Right sided Pyo-pneumothorax.

The child underwent Left lobe decortication under general anaesthesia. We Extubated the child on POD-1, the child maintained oxygen saturation of 95-96%on Room air. The child was treated with multimodal analgesics and antibiotics and discharged on POD-10 .

Case -3
A 11year old female child , weighing 23.5kg , born via normal vaginal delivery, had presented with complaints of fever with neck stiffness with restricted neck movements , recurrent fever episodes associated with breathlessness.

On examination, HR- 146bpm,BP – 90/60mm of Hg, RR-38breaths/minute, SPO2- 97%on nasal prongs with 6liters O2, Air entry was reduced bilaterally (L>R) with fine crepitations.

CXR- bilateral blunting of Cardiophrenic and cardio diaphragmatic angle and bilateral consolidation changes. On further investigation, Pleural fluid analysis (left side) – yellowish turbid appearance with sugar-52mg%, TLC-2000cumm, Polymorphas-40% , Lymphpcytes -10, mesothelial cells& macrophages-50% , protein-0.523gm%

Pleural fluid analysis (right side) – reddish turbid appearance with sugar-48mg%, TLC-1200cumm, Polymorphas-30%, Lymphpcytes -40, mesothelial cells& macrophages-30%, protein-0.456gm

USG abdomen& Thorax:- Mild ascites , moderate to gross pleural effusion.

Mantuex test – negative .

CT Neck (plain+ contrast):
collection in the retropharyngeal space extending into dangerous space of about 2.7*3.1*3.3cm posterior to bucco pharyngeal space in the pharynx

The child was diagnosed to have Left sided empyema with retropharyngeal abscess with bilateral pleural effusion

The child underwent Left sided decortication under general anaesthesia.

We Extubated the child on POD-1, the child maintained oxygen saturation of 95-96%on Room air. The child was treated with multimodal analgesics and antibiotics and discharged on POD-10 .

Case -4
A 7 hour old 2.8 kg male child born via full term normal vaginal delivery presented with difficulty in breathing with shrill cry post delivery , difficult to accept breast feeding.

On examination , HR- 150bpm, RR-54breaths/minute, SPO2- 92-93 %on room air Air entry was bilateral reduced at the bases , APGAR score -8. After thorough oro-pharyngeal suctioning , Oro gastric tube was passed and it coiled. Since the child's started desaturating , it was decided to intubate the child with 3mm ETT and was put on SIMV mode with FiO2-100% . On further evaluation , complete blood count – with in normal limits. 2D-ECHO was found to be normal. CXR-Coiling of Oropharyngeal tube. The child was diagnosed to have Type C Tracheoesophageal fistula on MDCT.

After pre-anaesthetic evaluation, the child underwent primary closure with end to end anastomosis.

We Extubated the child on POD-1, the child maintained oxygen saturation of 95-96%on Room air. The child was treated with multimodal analgesics and antibiotics and discharged on POD-10 .

Case -5
A 1day old 1.8 kg female child born via preterm LSCS , presented with shrill cry and copious fine white frothy discharge from the mouth

On examination , HR- 168bpm, RR-58breaths/minute, SPO2- 86%on room air and 97% on cpap.

Air entry was bilaterally reduced at the bases with fine crackles, APGAR score -6. After thorough oro-pharyngeal suctioning, Oro gastric tube 8F was passed and it coiled. Per abdomen examination-Abdominal distension. Since the child started desaturating, the child was intubated with 2.5mm ETT and was put on CMV mode with FiO2-100% .

On further evaluation. 2D-ECHO. Mild ASD with small patent foramen ovale . CXR- Coiling of Oropharyngeal tube. The child was diagnosed to have Type 3B Tracheoesophageal fistula on MDCT. After pre-anaesthetic evaluation, the child underwent Oeso phagostomy with gastrostomy.

We extubated the child on POD-3, the child maintained oxygen saturation of 95-96%on Room air. The child was treated with multimodal analgesics and antibiotics.

Intraoperatively
Two IV access were secured for all 5 patients and the procedure was done with Two lung ventilation with endotracheal tube for classic thoracotomy .

CONCLUSION:
The Aesthesiologists are prone to face many challenges while handling and caring for infants and children undergoing thoracotomy, many like consideration of poor organ development/ prematurity, difficult airway ,negotiation of endotracheal tube beyond the fistula, cardiorespiratory compromise, maintenance of oxygen saturation with adequate depth of anesthesia, perioperative analgesia and postoperative intensive care. Multidisciplinary approach. Its very essential to do single lung ventilation during these procedures , because that will give the surgeon better surgical view and lesser surgical complications. We were able to successfully manage these patients with two lung ventilation. The DLT was not used due to unavailability of appropriate sized DLT for particular neonatal or pediatric age group.

Ventilation was done with minimal tidal volume and PEEP to avoid trauma to lung by minimizing the lung entering the operative field , while the surgeon were handling the affected lung and Lung recruitment procedures were used when there was lung retraction and desaturation intraoperatively. It is important to have a working knowledge of respiratory physiology and anatomy of neonatal and pediatric age group and a thorough understanding of primary underlying lesion and associated anomalies are essential for the planning and execution of appropriate intraoperative care and achieve a better post-operative outcome.

REFERENCES :

1. Pediatric Anesthesia ISSN 1155-5645
2. Murray.Torres, et al.: Pediatric thoracic anesthesia
3. Lau C-T, Wong KKY. Long-term pulmonary function after lobectomy for congenital pulmonary airway malformation: Is thoracoscopic approach really better than open? J Pediatr Surg 2018;53:2383-5.
4. Lee EY, Tracy DA, Mahmood SA, Weldon CB, Zurakowski D, Boiselle PM. Preoperative MDCT evaluation of congenital lung anomalies in children: Comparison of axial, multiplanar, and 3D images.AJR Am J Roentgenol 2011;196:1040-6.
5. Narayanasamy S, Adler E, Mahmoud M, Burkley M, Lim FY, Subramanyam R. Airway management of congenital pulmonary airway malformation resection in neonates and infants: A case cohort study. Paediatr Anaesth 2019;29:808-13.
6. Baum VC, Barton DM, Gutgesell HP. Influence of congenital heart disease on mortality after noncardiac surgery in hospitalized children. Pediatrics 2000;105:332-5.
7. Wilson WC, Kapelanski DP, BenumofJL, Newhart JW II, Johnson FW, Channick RN. Inhaled nitric oxide (40 ppm) during one-lung ventilation, in the lateral decubitus position, does not decrease pulmonary vascular resistance or improve oxygenation in normal patients. J Cardiothorac Vasc Anesth 1997;11:172-6.
8. Pagel PS, Fu JL, Damask MC, Davis RF, Samuelson PN, Howie MB, et al. Desflurane and isoflurane produce similar alterations in systemic and pulmonary hemodynamics and arterial oxygenation in patients undergoing one-lung ventilation during thoracotomy. Anesth Analg 1998;87:800-7.
9. Malherbe S, Whyte S, Singh P, Amari E, King A, Mark Ansermino J.Total intravenous anesthesia and spontaneous respiration for airway endoscopy in children–A prospective evaluation. Pediatr Anesth 2010;20:434-8.
10. Neumann RP, von Ungern Sternberg BS. The neonatal lung–physiology and ventilation. Pediatr Anesth 2014;24:10-21.