Case Report

Anesthetic management of trachea esophageal fistula posted for thoracotomy and gastrostomy

B Anusha[1*], P. Rajeshwar[2], Chokkalla Anusha[3], B.Manaswini[4]

[1]3rd year Post Graduate, Department of Anaesthesia: Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad, Telangana, India
[2]Professor, Department of Anaesthesia: Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad, Telangana, India
[3]3rd year Post Graduate, Department of Anaesthesia: Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad, Telangana, India
[4]3rd year Post Graduate, Department of Anaesthesia: Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad, Telangana,India

Received: 10-09-2021 / Revised: 26-10-2021 / Accepted: 17-11-2021

Abstract
Tracheoesophageal fistula and oesophageal atresia are a surgical emergency, presenting during first week of extrauterine life they are usually associated with other congenital anomalies. They are usually complicated due to aspiration of gastric contents leading to pneumonia and respiratory distress. Ligation of fistula and reconstructive anastomosis of the ends of oesophagus is mainstay of treatment. Anaesthesia and skill of anaesthesiologist during pre, intra and post operative periods plays the key role in successful treatment and survival of neonate.
Keywords: Tracheoesophageal fistula, Oesophageal atresia, Neonate

Introduction
Tracheo esophageal fistula is a rare congenital developmental abnormality , affecting 1 in 2500-3000 live births present during first week of life, for which immediate surgical intervention is required in most of the cases[1,2].Advances in surgical practice and neonatal intensive care mean that neonates with congenital oesophageal atresia/tracheoesophageal fistula (EA/TEF) often present with minimal lung pathology and excellent lung compliance. Many paediatric anaesthesiologists routinely paralyze these patients following demonstrated adequacy of bag-mask ventilation and position the endotracheal tube (ETT) well above the fistula, without compromising ventilation. Perioperative mortality continues to fall, and yet, these repairs can be fraught with complications. Critically, anaesthesiologists must recognize those patients at additional risk: those with coexisting complex congenital heart disease (CHD), weight < 2kgs poor pulmonary compliance, large, pericarinal fistulas and those scheduled for thoracoscopic repairs. Rigid bronchoscopy to characterize airway anatomy helps guide advanced airway strategies and decisions regarding postoperative disposition. Knowledge and ability of anesthesiologist to anticipate the challenges in managing neonates presenting for repair , play an important role in their treatment and survival[3]. A familiarity with the immediate complications and long term outcome and sequalae after tracheoesophageal fistula repair is important to ensure the best patient outcome.

Case report
A 4 months old male presented with frothing and vomiting for 1 week, shortness of breath for 1 day and was diagnosed with H type tracheoesophageal fistula, Pre anesthetic check up was done. No overt signs of respiratory depression, respiratory rate of 50/min.After prewarming the OT and premedicating with fentanyl 8 mcg IV, induced with sevoflurane and intubated with 3.5 mm cuffed ETT. Bilateral air entry confirmed and fixed. Left internal jugular vein cannulated with 4 French triple lumen catheters. Manual ventilation was performed using Jackson ree circuit. Child was placed in left lateral position after proper padding of all pressure points.A precordial stethoscope was fixed, for heart and breath sounds assessment. Hemodynamic stability was maintained by infusion of isolyte-p fistula was identified and ligated by surgeon. Child was ventilated post operatively in NICU extubation was done on POD 6 and enteral feeds were initiated on POD 7. Child was healthy and doing well at the time of discharge.When anesthesiologist encounters a case of TOF in a neonate, searching for VACTERAl group of anomalies is a prime important as it guides management. Presence of pneumonia or any other cardiac anomaly warrants for prior optimization.

Discussion
Tracheoesophageal fistula may be associated with some abnormal gene derived syndromes like Feingold syndrome (N-MYC), anopthalmia oesophageal genital (AEG) syndrome (SOX2) and other anomalies like VATER or VACTERL with frequent cardiac and anorectal defects. The anatomical classification describes 5 types –I, II, IIIA, IIIB, IIIC depending upon the oesophageal and tracheal defects but the most common is type III i.e. oesophageal atresia with distal TEF[4].Gastric distension and perhaps pneumoperitoneum are risks for neonates with TEF (treated by emergent needle decompression of the left upper quadrant of the abdomen). EA/TEF was once treated with a staged surgery, and anaesthetic texts still describe a preoperative gastrostomy. While a gastrostomy prevents life-threatening stomach rupture, it may worsen ventilatory instability by allowing a low-pressure leak through a 'bronchocutaneous' fistula, resulting in inefficient breathing[5,6]. Even with low lung compliance, there is little stomach insufflation during spontaneous breathing; positive pressure ventilation introduces this risk, especially in the presence of pulmonary pathology. When faced with inadequate

*Correspondence
Dr. B Anusha
3rd year Post Graduate, Department of Anaesthesia: Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad, Telangana, India.
E-mail: dr.anushabbb@gmail.com

intraoperative ventilation, the anesthesiologist must consider a wide range of possibilities, including stomach distension as well as more typical causes such as ETT obstruction.Anaesthetic management and protocol during repair of TOF/OA depends upon anaesthesiologist and his experience. In my case presentationI have always preferred to intubate the neonate while breathing spontaneously under inhalational anaesthetic agent. Induction of anaesthesia with oxygen and halothane/ isoflurane, topical spray of 1% xylocaine (not exceeding 3-5 $mgkg^{-1}$) over larynx and 1% xylocaine ($1mgkg-^{1IV}$) is a good combination. Some workers prefer to intubate under intravenous or inhalational induction with muscle relaxant. In presence of gastrostomy this technique is advantageous, but in absence of gastrostomy, further regurgitation and aspiration may occur. The ventilation should be done at low pressure. The tube is inserted into trachea as far as possible and chest is auscultated for bilateral ventilation. Gradually tube is with drawn till bilateral ventilation is insured. In cases of a large fistula just above the carina, the fistula may cause problem and sometimes the tip of tube may enter it. Gradual adjustment of tube sorts out the problem[7].Anaesthesia is maintained with inhalational agent with muscular paralysis. Once the patient is settled and positioned for right thoracotomy or neck incision, the job of anaesthesiologist starts in guiding the surgeon to locate the proximal oesophageal pouch and fistula. For the purpose a red rubber catheter or infant feeding tube is placed in proximal pouch. Time to time the tube is pushed to make proximal pouch prominent on demand of surgeon. Once thoracotomy has been done the lung is packed away to mobilise the distal segment of oesophagus for anastomosis. This may lead to sudden oxygen desaturation. The ventilating lung may be complicated due to pneumonitis. This further brings down the oxygen saturation. If it happens, surgeon is asked to stop and allow the lung to expand. All the time care is taken not to hyperinflate lungs to prevent barotrauma. Later chest is closed with or without a chest tube as per the need. Postoperative management protocol follows the available facilities and the lung condition of the neonate. It should includes Nursing in neonatal I.C.U, Care of respiratory distress, Antibiotics , Suctioning , Ventilatory support, Fluid & electrolyte control and Prevention of hypothermia Although the neonate is extubated in the operation theatre, but if ventilatory support is needed, the tube must be left in situ. Neck of neonate should never be extended while nursing because the anastomosis will stretch and give way as there is always a gap between the two ends of oesophagus, which surgeon has mobilised to bring together. The late life after the repair is not uneventful as tracheomalacia, gastro oesophageal reflux, oesophageal stricture may develop which needs dilatation or re-surgery[8,9].For starters, these individuals are at risk for concomitant airway anomalies such as tracheo-bronchomalacia, tracheal upper pouch, and tracheal stenosis/agenesis, which could influence whether or not muscle relaxation should be performed[10,11]. Second, the location of the fistula impacts therapy options: intubating beyond a pericarinal fistula may be problematic. The bronchoscopic findings of 113 newborns were published by Holzki et al[12] study TEF was >1 cm above the carina in 67 percent of the cases, and the 3 mm fistula) provided a breathing issue in 22 percent of the cases. If bronchoscopy reveals a big fistula, the anesthesiologist must be concerned about gastric distension, especially if there is diminished lung compliance. To provide appropriate mechanical breathing, a variety of airway methods have been tried, including one-lung ventilation, tracheal intubation distal to the fistula, Fogarty catheter occlusion, and fiberoptic tracheoscopy.The condition is further complicated by the anaesthetic administration of thoracoscopic EA/TEF repair[13,14,15]. Since 2001, the Royal Hospital for Sick Children in Edinburgh has treated more than half of EA/TEF cases thoracoscopically. Krosnar et al[15]. reviewed eight patients, all of which were preoperatively stable with minimum O2 requirements, nil or mild cardiac abnormalities (PDA, PFO, tiny perimembranous VSD), and nil or moderate preterm. TOF should be considered a touch stone in paediatric surgery. It demands early diagnosis, resuscitation and emergency surgical correction. The associated congenital anomalies worsen the out come. Although the result has tremendously improved in developed countries but in developing countries it is far behind. But with the availability of Neonatal ICU, ventilatory facility, and monitoring advancement result is improving day by day. Anaesthesiologist has to keep himself involved not only towards anaesthesia but also in surgical field.

Conclusion

Preoperative assessment of the newborn with EA/ TEF focuses on delineating complex CHD, impediments to pulmonary compliance, other comorbid disease and the demands of the surgical approach. Anesthetic management of a neonate undergoing TEF repair is a challenging task. It may become more complex due to coexisting anomalies in other organ systems, especially cardiac anomalies. Good preoperative assessment and preparation are required to identify problems and optimize the patients condition. Neonates require stabilization and correction of fluid electrolyte imbalance, hypothermia, hypoglycemic and poor chest condition. Airway management during TEF repair may present great challenges. Postoperatively, Vigilant postoperative monitoring in intensive care unit.

Conflict of Interest: Nil Source of support: Nil

References

1. L. Spitz, "Oesophageal atresia," Orphanet Journal of Rare Diseases, 2007;vol. 2, no. 1, p. 24
2. Banarjee S. Oesphageal Atresia the touch stone of paediatric surgery, J. Indian Med.Asso, 1997; 97(10) 432-5.
3. S. C. Fallon, S. D. St. Peter et al., "Congenital H-type tracheoesophageal fistula: a multicenter review of outcomes in a rare disease," Journal of Pediatric Surgery,2017; 52(11)1711–1714
4. Broemling N, Campbell F.Anesthetic management of congenital tracheoesophageal fistula. Pediatric Anesthesia. 2011; 21(11):1092–1099.
5. Richenbacher WE, Ballantine TV. Esophageal atresia, distal tracheoesophageal fistula, and an air shunt that compromised mechanical ventilation. J Pediatr Surg 1990; 25: 1216–1218.
6. Templeton JM Jr, et al. Management of esophageal atresia and tracheoesophageal fistula in the neonate with severe respiratory distress syndrome. J Pediatr Surg 1985; 20: 394–397.
7. Okamoto T, Takamizawa S, Arai H et al. Esophageal atresia: prognostic classification revisited. Surgery 2009; 145: 675–681.
8. Leendertse.; Hazebroek FWJ et al. Postoperative morbidity in patients with oesophageal atresia, Paed. Surg. International 1987: (2) – 2-3.
9. Demircan M, C et al. Tracheal agenesis and esophageal atresia with proximal and distal bronchoesophageal fistulas. J Pediatr Surg 2008; 43: e1–e3.
10. Shanbhag S, Millar C. Anesthetic management of subglottic stenosis complicating tracheo-esophageal fistula in a newborn. Pediatr Anesth 2008; 18: 1249–1250
11. Holzki J. Bronchoscopic findings and treatment of tracheo-oesophageal fistula. Pediatr Anesth 1992; 2: 297–303.
12. Mortell AE, Azizkhan RG. Esophageal atresia repair with thoracotomy: the Cincinnati contemporary experience. Semin Pediatr Surg 2009; 18: 12–19.
13. Patkowsk D, Rysiakiewicz K, Jaworski W et al. Thoracoscopic repair of tracheoesophageal fistula and esophageal atresia. J Laparoendosc Adv Surg Tech A 2009; 19 Suppl 1: S19–S22
14. Rice-Townsend S, Ramamoorthy C, Dutta S. Thoracoscopic repair of a type D esophageal atresia in a newborn with complex congenital heart disease. J Pediatr Surg 2007; 42: 1616–1619.
15. Krosnar S, Baxter A. Thoracoscopic repair of esophageal atresia with tracheoesophageal fistula: anesthetic and intensive care management of a series of eight neonates. Pediatr Anesth 2005; 15: 541–546.