

Anaesthesia for Oesophageal Atresia (OA) and Tracheoesophageal Fistula (TOF) Repair in a Developing Hospital-Case Report

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Summary: Anaesthesia for oesophageal atresia (OA) and tracheoesophageal fistula (TOF) repair pose a great challenge to the anaesthetist particularly in the preparation and optimization of the patient, meticulous intraoperative and postoperative management. We report the successful management of a four day old neonate with OA and TOF who was operated and admitted into the intensive care unit and later discharged to the paediatric surgical ward for further management. It is concluded that with proper decision making process and commitment such treatment can be managed in our hospitals despite our limited resources.

Keywords: Tracheoesophageal Fistula (TOF): Anaesthetic management, oesophageal atresia, tracheoesophageal fistula repair, tertiary hospital.

I. Introduction

Tracheoesophageal fistula occurs in about 1 in every 3000- 4500 births and remains one of the major challenges in neonatal surgery and anaesthesia.¹ With surgical repair, the rate of survival exceeds 90% even in low birth weight infants. Significant mortality is now limited to infants with severe coexisting congenital or chromosomal abnormalities.¹ Congenital heart disease is the most common co-morbidity in the tracheoesophageal fistula and can be a major determinant in survival.²

Tracheoesophageal fistula manifests in the neonate within hours to days of life. It is considered surgically correctable anomaly of the gastrointestinal and respiratory systems.³ TOF and the peri-operative anaesthetic considerations are of acute importance to the anaesthetist. Prior to the first successful staged repair in 1939, oesophageal atresia and associated TOF were uniformly fatal. Advancement in paediatric anaesthetic techniques and monitoring, neonatology, and paediatric surgery have reduced mortality figures.⁴ Therefore, the aim of this report is to bring out silent features in the anaesthetic management of OA and TOF in the developing hospital with limited resource.

II. Case Report

The Neonate's mother was a 28 year old para 8 with six alive at the time of delivery. The Neonate was a product of spontaneous vaginal delivery (SVD) at term. The mother was booked at 27th weeks of gestation at the University of Maiduguri Teaching Hospital (UMTH). The birth weight was 2.9 kg with APGAR score of 5 and 7 in the 1st and 5th minutes respectively. There was positive history of poly-hydramnios during this index pregnancy. The baby developed respiratory distress, excessive salivation, difficulty with breathing and cyanotic spells in the first hour after delivery. There was an associated absent anal opening and abdominal distension. No any other anomaly was noted.

On examination it revealed a pink baby, afebrile to touch, anicteric and with excessive salivations. The heart rate was 152 beats per minute and the respiratory rate of 40 cycles per minute. There were normal first and second heart sounds with no murmurs and the chest was clinically clear. There was epigastric abdominal distension, soft and moves with respiration with obvious peristalsis as shown in Fig 1. There was absence of the anal opening with well developed gluteal fold.

An impression of Triple atresia, Tracheoesophageal fistula (TOF), duodenal atresia with ano-rectal malformation was made. Investigations revealed packed cell volume of 63%, electrolytes, urea and creatinine were within normal limits, abdominal x-ray was normal but the Babygram confirmed arrest of a radio opaque orogastric tube about 10cm from the lower incisor. The patient was placed on 4.3% dextrose in saline, and ceftriaxone injection according to the estimated weight, vitamin K 0.5mg injection and to position baby prone at 30 degrees head up and intermittent oro-pharyngeal suctioning. Colostomy was done on the 2nd day of delivery under local anaesthesia as preparation for the definitive operation. On the 3rd day of delivery a consult was sent to the Anaesthetist, who reviewed and assessed the patient as ASA111E by the American Society of Anaesthesiologist classification and ordered a grouping and cross matching of one unit of whole blood.

Anaesthetic Management

The anaesthetic machine, the modified Ayre's T-piece breathing system, laryngoscopes with number 0 and 1 Miller blades, polyvinyl chloride uncuffed sterile endotracheal tubes sizes 2.5 and 3.0 mm ID and sizes 5 and 8 French suction catheters were made available. The drugs including 0.02 mg/kg of atropine, 2.5 mg/kg of Suxamethonium chloride, 0.08 mg/kg of pancuronium and 0.05 mg/kg of pentazocine were drawn and labelled. All equipment were checked and the patency of the intravenous line was confirmed and predetermined fluid volume were commenced.

The patient was transported to the theatre on the warm blanket and air conditioner had been switched off one hour before baby was brought to the theatre. Precordial Stethoscope and pulse oximeter were attached and basic vital signs were taken as shown in Fig 2 and 3. The patient was induced with 2% Halothane in 100% oxygen and followed by 7mg of Suxamethonium to facilitate intubation. An attempt at intubation was made using size 3.0 mm endotracheal tube attached to the anaesthetic machine and checked for equal and bilateral air entry were made. The tube was secured with adhesive plaster and patient throat was packed with moistened gauze. The patient was positioned left lateral for thoracotomy and before incision was made 1.5mg of pentazocine was given. The used of 100% Oxygen and 1.5% Halothane and 0.2mg of pancuronium was given. Nasogastric tube was passed to aid the repair. There was a period of one lung ventilation to allow for surgical access. The operation was performed via an extrapleural approach. The intraoperative vital signs were as follows: pulse rate ranges from 100-160 beats per minutes and oxygen saturation of 90-100%.

The intraoperative surgical finding reveals a proximal blind pouch with distal tracheoesophageal fistula. The surgery done was closure of the fistula oesophago-oesophagostomy following thoracotomy. The total estimated blood loss was 80mls and urine output of 20mls. The fluids used were 450 mls over 3 hours of the surgery and 40mls of whole blood was transfused.

At the end of the surgery, the patient was taken to the intensive care unit (ICU) where patient was placed on a mechanical ventilator with the following settings: FiO₂ of 0.5, Respiratory rate of 20/min, PEEP of 5cmH₂O. Intravenous pentazocine 1.5mg 8hrly, pancuronium 0.3mg 3hrly, ceftriaxone 290mg 12hrly and intravenous fluids 4.3% dextrose saline was prescribed. The patient spent three days in the ICU and made appreciable progress and the pancuronium was stopped on the second day in the ICU and the remnant neuromuscular blockade was reversed using 0.04 mg/kg of Neostigmine and 0.02 mg/kg of atropine on the third day. The patient was stable and was transferred to the paediatric surgical ward for further management.



Fig 1

Fig 2

Fig 3

III. Discussion

It was documented that excessive amniotic fluid or polyhydramnios on prenatal ultrasound arouses suspicious of OA/TOF or some obstruction of the gastrointestinal tract.⁵ There was positive history of polyhydramnios in this patient. After delivery, the presence of atresia is usually confirmed by the inability to pass a Nasogastric tube into the stomach, that's what helps us in the diagnosis. Furthermore, most of the signs and symptoms of OA were present in this patient.⁶

The neonate who presents for repair of OA and TOF represents a significant challenge to the Anaesthetist. Some of the difficulties encountered during the anaesthetic management include ineffective ventilation due to the endotracheal tube being placed in the fistula, massive dilatation, severe pre-existing lung disease from previous aspiration of gastric contents and/or respiratory distress syndrome of prematurity, and associated anomalies, particularly cardiac.⁷ However, some of these challenges were encountered such intraoperative desaturation because of intermittent one lung ventilation to exposed surgical field.

Anaesthetic and surgical management focuses on ventilating the lungs without ventilation of the fistula. Special attention to placement of the endotracheal tube is warranted, and gastrostomy either preoperatively under local anaesthesia as in this case or soon after induction is sometimes used to decompress the stomach and prevent gastric distensions.⁷ Nasogastric tube was passed and the stomach was decompressed before induction of anaesthesia. A Precordial stethoscope was fixed to the axilla to help in the monitoring of the ventilation and the heart rates.

Positioning is left lateral for the right thoracotomy to ligate the fistula and perform oesophageal anastomosis; this patient was also positioned left lateral to ease access to the oesophagus. An extrapleural

approach to the posterior mediastinum is used by the surgeon. Desaturation may occur when the surgeon packs the lungs in order to mobilize the distal segment of the oesophagus for anastomosis. Expansion of the lungs may be required to correct a low oxygen saturation⁵ Hypoxaemia may result from intubation of the right main stem bronchus, endotracheal tube obstruction by secretions or purulent drainage, bleeding kinking of the bronchus or trachea and atelectasis.⁶

Further anaesthetic management may involve becoming more familiar with endoscopic surgical procedures as they are becoming an attractive alternative to open procedures.⁸ As endoscopic surgeries are getting wide acceptance globally however, in the developing countries like ours we are still operating the open surgery as in this index case. Newer airway tools such as the proseal laryngeal mask airway which supports positive airway pressure better than its predecessors and also allows for drainage of gastric fluid and air, thereby decreasing the chance of gastric insufflations.

The mortality rate for OA and TOF is less than 1.5% for patients without major cardiac anomalies and a birth weight greater than 1500 grams.³ This baby weighed 2.9kg at birth and had no cardiac anomaly. These are favourable factors for neonatal survival as in this case.

Conclusion

Anaesthetic management of OA and TOF posed a great challenges to the anaesthetist but with adequate assessment of the patient, meticulous perioperative management including one lung ventilation and proper communication among the team members yielded a successful outcomes even in a poor resource centres like ours.

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