Tracheoesophageal fistula repair in a neonate with tetralogy of Fallot: An anesthetic challenge

Sir,

Tracheoesophageal fistula (TEF) is a surgical emergency. Advancements in pediatric surgical and anesthetic techniques with better neonatal intensive care facilities have increased the survival rate of these patients to above 90%.[1] In 50% of the cases, TEF is associated with other congenital anomalies, most commonly congenital heart disease (CHD), thus increasing perioperative morbidity and mortality.[2]

A 1.65 Kg male child was referred to our hospital with type C TEF, anorectal malformation, and associated tetralogy of Fallot (TOF). Prenatal ultrasound was remarkable for polyhydramnios and TOF. His room air oxygen saturation (SpO2) was 80-84% and air arterial blood gas (ABG) showed moderate hypoxia, with a PaO2 of 45.2 mmHg. The child was shifted to operating room for urgent TEF repair and loop colostomy and monitored for heart rate (HR), noninvasive blood pressure (NIBP), electrocardiogram (ECG), SpO2 and end-tidal carbon dioxide (EtCO2). Anesthesia was induced with intravenous fentanyl 2 μg/kg, midazolam 0.05 mg/kg, ketamine 2 mg/kg, and atracurium 0.5 mg/kg. Child was maintained on 0.8-1% isoflurane in 100% oxygen. Arterial blood pressures were also continuously monitored.

During surgical manipulation of the left lung, although oxygen saturation remained stable between 80% and 85%, EtCO2 increased to 70 mmHg. After removal of surgical retraction and reexpansion of the right lung, ventilation improved, resulting in increase of oxygen saturation to 85-90% and a decline of PaCO2 to 50 mmHg. Intraoperatively, HR varied from 110 to 140 beats/min and NIBP from 60-80 to 45-60 mmHg. Estimated blood loss was nearly 10-15 ml and patient was administered 60 ml of dextrose 5% saline 0.2%. Postoperatively, the neonate was shifted to ICU on ventilatory support, followed by extubation on the second day.

TEF manifests within hours to days of life. Prematurity, birth weight <1500 g and associated CHD increase perioperative mortality and decrease survival rate.[2] Before palliation of CHD, urgent TEF repair is important. Delay in ligation of TEF causes gastric distension resulting in hypoventilation, hemodynamic compromise, and aspiration, making early

surgical intervention necessary.[2] The anesthetic goal is to maintain balance between pulmonary and systemic blood flow and prevent the increase in right-to-left intracardiac shunt.[3] At induction the main goal is to prevent hypercyanotic spells. Compared to inhalational induction, intravenous induction is faster in patients with a right-to-left shunt, with ketamine being the most common induction agent used.[3] Intraoperatively, the aim is to prevent peripheral vasodilation or pulmonary hypertension that would increase the right-to left shunt. This is achieved by avoiding hypoxia, hypercapnia, acidosis, hypothermia, and maintaining euvolemia.[3] In patients with cyanotic heart disease, pulse oximetry overestimates SpO2; EtCO2 readings underestimate PaCO2, and such discrepancy increases with hypoxemia.[4] Hence, ABG monitoring is essential. Postoperatively, neonates should be shifted to neonatal ICU as they require special care and monitoring, with adequate analgesia being critical.[5]

To conclude, TEF is most commonly associated with CHD, which can be a major determinant of survival in neonates undergoing surgery for TEF repair. Precise planning and a good foundation in physiological and pharmacological principles of CHD are important for the anesthetist. Further, coordinated team approach and good communication between the intensivist, anesthesiologist, pediatric surgeon, and cardiologist is the key to the successful management of TEF repair in newborns with CHD.

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Conflicts of interest
There are no conflicts of interest.

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