

## Anesthesia Considerations in Neonate with Tetralogy of Fallot Posted for Laparotomy

Sir,

A 19-day male neonate, weighing 3.65 kg, was referred to our hospital with diagnosis of tetralogy of Fallot. He presented with gradual distension of abdomen with radiological evidence of large bowel distension, hence, was planned for laparotomy under general anesthesia. Other associated anomalies were left ventricle choroid plexus cyst, bilateral microphthalmia, microcornea, and aniridia. Postnatal echocardiography revealed right ventricular hyperplasia, infundibular stenosis, atrial septal defect, and overriding of aorta. His room air oxygen saturation was 64%–68% and on-air arterial blood gas (ABG) showed PaO<sub>2</sub> 56 mmHg. Heart rate was 138 bpm and respiratory rate was 50/min neonate was taking oral propranolol 0.8 mg 6 hourly as advised by pediatric cardiologist. Blood investigations (hemoglobin 18 g% and platelet 303 mm<sup>3</sup>) were within normal limits. Patient was monitored with electrocardiography, noninvasive blood pressure (NIBP), pulse oximetry, end-tidal carbon dioxide, and temperature preoperatively followed by infective endocarditis prophylaxis (ceftriaxone 50 mg/kg intravenous [IV]). Anesthesia was induced with ketamine 2 mg/mg, fentanyl 1 mcg/kg, and atracurium 0.5 mg/kg IV. Anesthesia was maintained with 0.8%–2% sevoflurane with 100% oxygen. Intraoperative NIBP reading varied between 48–68 mmHg and 38–52 mmHg. SPO<sub>2</sub> reading varied between 55% and 92%. This was treated with fluid bolus 10 ml/kg, empirical sodium bicarbonate 1 mEq/kg, and intermittent phenylephrine bolus (5 mcg/kg) up to three times for hypotension associated with desaturation. Hirschsprung disease was suspected clinically and loop colostomy was performed with blood loss of 15 ml. 1% dextrose Ringer's lactate solution was used for maintenance and replacement of loss. Postoperatively, neonate was extubated after adequate neuromuscular recovery and shifted to NICU for further care.

Tetralogy of Fallot is cyanotic heart disease, accounting for 10% of congenital heart disease.<sup>[1]</sup> It includes ventricular septal defect, right ventricular outflow tract obstruction (pulmonic stenosis), right ventricular hypertrophy, and overriding of aorta.<sup>[1]</sup> Its presence increases the perioperative risk and mortality.<sup>[2]</sup> They can also have noncardiac anomalies such as neurological anomalies, musculoskeletal anomalies, and ophthalmological anomalies which were noted in index case. Anesthetic goals in these patients being to maintain or increase the systemic vascular resistance (SVR) minimize pulmonary vascular resistance (PVR) and prevent hypercyanotic episodes intraoperatively.<sup>[2]</sup>

The presence of right to left intracardiac shunt prolongs the inhalational induction in view of poor pulmonary blood flow, whereas IV induction is faster. IV ketamine is the induction agent of choice as it increases the SVR.<sup>[3]</sup> Supplementary caudal block may result in low SVR, hence should be avoided. Euvolemia should be maintained to prevent dynamic right ventricular outflow tract obstruction. Air bubbles from the infusion pump should be avoided as they can be shunted into arterial system causing emboli. Hypoxia, hypercapnia, and acidosis (metabolic and respiratory) should be avoided as it could increase PVR.<sup>[4]</sup> Development of cyanotic spell can occur intraoperatively due to spasm of hypertrophied pulmonary infundibulum.<sup>[4]</sup> It responds to increase in volume and increase in SVR with alpha agonists such as phenylephrine or ephedrine and ceasing infundibular spasm with beta blocker. Increase in SVR decreases the right to left shunting and improves arterial oxygenation. Anesthetist should also be aware that pulse oximetry overestimates arterial oxygen saturation as saturation decreases, end-tidal carbon dioxide readings underestimates PaCO<sub>2</sub>, and discrepancy worsens with hypoxemia; hence, ABG analysis is useful in these situations.<sup>[5]</sup>

Thorough understanding of applied physiology and pharmacology is the key to successful perioperative management in tetralogy of Fallot.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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