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Original Research Paper

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ANESTHETIC MANAGEMENT OF ZERO-DAY TRACHEOESOPHAGEAL FISTULA WITH TAUSSIG BING ANOMALY

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ABSTRACT Neonatal babies have specific physiological and pharmacological considerations regarding anesthesia. Newborns from 0 to 28 days are more likely to suffer from adverse cardiopulmonary conditions during the perioperative period. This paper presents the case of a zero-day baby with multiple Congenital Cardiac anomalies like Taussig-Bing Anomaly (DORV, VSD, PDA), Levocardia, TGA, and distal Tracheoesophageal Fistula (TEF) for emergency surgical repair. It addresses the anesthetic challenges like awake intubation for securing the complex airway and maintaining an adequate ventilation-perfusion ratio.

KEYWORDS : Taussig-Bing Anomaly; Double Outlet Right Ventricle; General Anesthesia; Levocardia; PDA; Right-Sided Aortic Arch; VSD; Tracheoesophageal Fistula; TGA; Zero Day-baby.

INTRODUCTION

Any tracheoesophageal fistula is diagnosed in a newborn between hours to days. TEF and perioperative anesthetic considerations are important when dealing with a surgically correctable gastrointestinal and respiratory abnormality. However, successful surgical repair has 90% survival rate [1], even in low-birth-weight babies [2]. Pneumonia is caused by repeated aspirations that aggravate respiratory distress due to underlying congenital heart disorders [3].

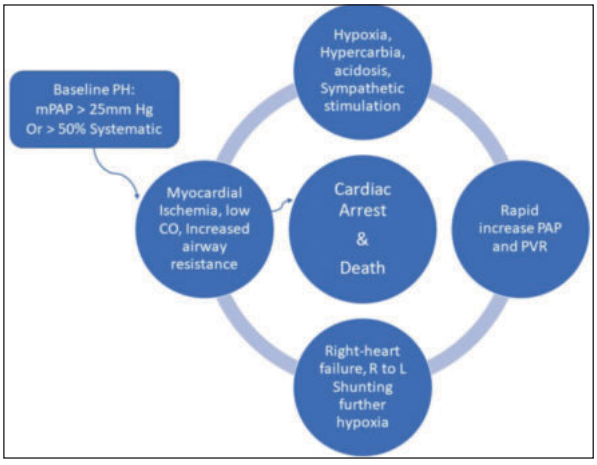
In 1949, Taussig (1898–1986) and Bing (1909-2010) reported the Taussig-Bing abnormality, a rare congenital cardiac malformation. TGA, DORV, Levocardia, and Taussig-Bing cardiac abnormalities were diagnosed in our case. Double Outlet Right Ventricle is an uncommon congenital heart disorder.

The aorta is transposed into the right ventricle, and the pulmonary artery is malpositioned. Incidence of Taussig-Bing 0.03-0.14 per 1000 live births [4]. In our case, the aorta and pulmonary artery originated from the right ventricle along with parallel systemic and pulmonary circulations. We required a comprehensive strategy to manage our zero-day TEF baby's anesthesia.

CASE REPORT

A 2000 gm male newborn was delivered by elective cesarean section at 37 weeks of gestation. In the NICU, the baby's heart rate was 146 beats per minute, his respiratory rate was 50 beats per minute, and his room air saturation was 60% and increased to 80% with 5 liters of oxygen.

A systemic examination found a systolic ejection murmur in the parasternal region with loud P2 and bilateral conducted sounds in lung fields. The arterial blood gas measurement revealed a pH of 7.46, a PaCO2 concentration of 29.5 mmHg, a PaO2 concentration of 35 mmHg, HCO3 concentration of 20.3 mmHg, and a lactate concentration of 5.4 mmol/liter. Bedside ultrasound and screening echo confirmed diagnosis of TEF.



The Vicious circle of pulmonary hypertensive crisis

Figure 1 illustrates the circle of pulmonary hypertension [5]. Our case presented most of the stages present in the circle. Unrestricted L to R shunting results in increased pulmonary flow and congestive heart failure. Initially, pulmonary hypertension is reactive, responding to hypothermia, surgical stress, metabolic acidosis, hypoxia, hypercarbia, and high intrathoracic pressure. However, pulmonary hypertension becomes permanent in the latter stages. As a result, our patient's anesthetic goals included increasing of PVR.

DISCUSSION

Gastrotrichs reflux into TEF causes pneumonitis, which needs immediate emergency surgical correction [6]. The primary repair includes ligating the fistula and then anastomosing the esophagus.

Pre-operative stabilization was done in NICU. Dehydration and hypoglycemia were addressed with maintenance fluids containing glucose (1/4 normal saline with 5% dextrose) at 4ml/kg/hour (32 ml over four hours). To decrease the incidence of perioperative respiratory infections, prophylactically IV Cefipime 100mg BD and Amikacin 30mg 36 hourly were administered [7].

The infant was maintained semi-upright while suction was administered to the upper esophageal pouch and oropharynx. A precordial stethoscope was attached to the patient's left axilla. Awake intubation with inhalational induction by spontaneous breathing was employed. The airway was secured was using a three-sized uncuffed portex endotracheal tube. Sevoflurane was the inhalational induction agent of choice. Because awake intubation was used [8], a meticulous demonstration of bilateral air entry without stomach distension was done before general anesthesia. Endotracheal tube placement was made more accessible by entering the tube as feasible and gently withdrawing it until bilateral air entry was accomplished. After the neonate had been deeply anesthetized, muscle relaxants of choice (atracurium 2 mg, fentanyl 5mg IV) were given, followed by moderate, positive pressure ventilation. The supply of systemic oxygen was continuously monitored.

Despite the surgical stress exerted on our newborn, the goal of anesthetic therapy was to preserve a healthy balance of pulmonary and systemic blood flow. Cyanosis was avoided by preventing acidosis, hypercapnia and maintaining sufficient breathing and euvolemia [9]. Metabolic alkalosis was addressed by hyperventilation. Perioperative fluid administered was ensured through the Holliday-Cigar formula [10]. There by preventing intravascular thrombosis.

The infant was positioned in the left lateral for a right thoracotomy to ligate the fistula and esophageal anastomosis. Intraoperative desaturation till 56% was noticed when the surgeon packed the lung to mobilize the distal portion of the esophagus for anastomosis, which was corrected by increasing FiO_2 to 100%. According to the Waterson Classification [11] scoring method, our zero-day infant weighed less than 2000 gm, necessitating elective postoperative ventilation.

CONCLUSION

The ultimate goal during induction is to intubate without gastric distension. There are various approaches for securing the anticipated difficult airway. Contemporary approaches like Pediatric Video Laryngoscope for intubation and fiberoptic bronchoscopy (FOB) for confirmation of ET Tube placement are suggested. In our case, due to low resources, we used a conservative approach involving inhalational induction, spontaneous respiration, and awake intubation, thereby avoiding positive pressure mask ventilation. Once our baby was positioned for surgical incision, the reconfirmation of the ET tube was carried out by auscultating bi-lateral breath sounds and gradual withdrawal until bi-lateral ventilation was satisfied. Close communication with the surgeon was paramount during the surgery because upper lung collapse is common due to use of Retractors, leading to significant hypoxemia. As per the predictions given in Spitz system, the mortality rate of low-birth-weight neonates during TEF surgery along with complicated congenital cardiac anomalies is 10% in developed countries, but the same is between 40-80% in low resource settings. Our medical setting belongs to developing countries and has low advance pediatric airway management resources; yet the perioperative anesthetic management was carried out successfully and the baby was sent to Neonatal intensive care

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