

Anaesthetic Management in Neonates with Esophageal Atresia and Tracheoesophageal Fistula

Arzu Esen Tekeli*, Semra Karataş

Anaesthesiology and Reanimation Clinic, Van Regional Training and Research Hospital, 65080, Van

*Corresponding Author:

Name: Arzu Esen Tekeli

Email: atekelim@gmail.com

Abstract: Neonates with tracheoesophageal fistula (TEF) carry risk for gastric distention and pneumoperitoneum. Anaesthetic management involves airway management, anaesthetic induction and monitorization, control of postoperative trends. Anaesthetic management focuses on lung ventilation rather than fistula ventilation. Technique involves avoiding muscle relaxation and not to apply excessive positive pressure until fistula is controlled. Patients with medical history including tracheoesophageal fistula repair may have gastroesophageal reflux, tracheomalacia, obstructive and restrictive pulmonary diseases, airway reactivity and recurrent pneumonia. This article aimed to identify anaesthetic challenges and to emphasize the necessity of providing a safe airway primarily and an effective pulmonary ventilation with a minimal transition through gastrointestinal tract in such a case that needed emergency surgery due to tracheoesophageal fistula and esophageal atresia in the neonatal period.

Keywords: Esophageal atresia, Tracheoesophageal fistula, Neonate, Anaesthetic management.

INTRODUCTION

Esophageal atresia is a developmental defect of upper gastrointestinal tract. It is the interruption of the continuity between upper and lower esophagus. Esophageal atresia may be accompanied with tracheoesophageal fistula or not[1]. Esophageal atresia is a rare condition (1/2500-4500). It is considered a surgical emergency and life-threatening in the neonatal period. Thirty percent of the cases were associated with prematurity and 50% of the cases are accompanied with congenital anomalies, particularly cardiac anomalies. Major congenital cardiac disorders and low birth weight are the independent determinants of critical perioperative events and mortality[2]. Esophageal atresia can be diagnosed by prenatal and postnatal imaging. The awareness of the anomaly decreased the complications[3]. An anaesthetist should perform a comprehensive and differential diagnosis in case of intraoperative insufficient ventilation and also should consider other potential common factors that lead to obstruction of endotracheal tube[4,5]. The surgical management of tracheoesophageal atresia involves early division of the fistula and primary esophageal anastomosis[6]. Although, postoperative complications show decreasing trend in the developing countries such as Turkey, however, all of the factors including delayed diagnosis, prematurity, low birth weight, delayed application to surgical center, sepsis, pulmonary complications involving pneumonia and insufficient nursing services contribute to reduction in survival rate[3].

CASE REPORT

TEF surgery was planned for the 3-day old male infant with birth weight of 2.5 kg. The infant without any comorbid disease except TEF was taken to the operation room due to informed consent from his family. Monitorization involving PHR (peak heart rate), ETCO₂ (End tidal carbon dioxide) and SpO₂ (Partial oxygen saturation) was performed. Body temperature of the infant was maintained using a warming blanket (to adjust body temperature 36.5°C) and monitored. The infant had SpO₂ 91% and pulse rate of 130 beats/minute. The required fluids were heated to adjust the body temperature to be 36.5°C. A vascular access was established using a 26 gauge purple branule through inferior face of the wrist. The infusion of 3.33% Dextrose and 0.3% Sodium Chloride for 20cc/hour was initiated. The positive pressure ventilation prior to induction was avoided. IV 1µg/kg fentanyl and 5mg/kg thiopental were administered for induction. The patient was intubated using uncuffed endotracheal tube No 3. The endotracheal tube was inserted into the right mainstem bronchus voluntarily. Subsequently, the endotracheal tube was gradually withdrawn until respiratory sounds from left side were obtained. This technique allowed placing tip of the endotracheal tube behind the fistula and provided to avoid massive distention of the stomach. Invasive arterial blood pressure and O₂ saturation were monitored using pulse oximeter. Maintenance was provided by O₂ 50% - N₂O 50% and 2.5% MAC sevoflurane (minimum alveolar concentration). The

surgeon performed bronchoscopy to insert a catheter into the trachea. A thoracotomy under right armpit was performed to push the lung forward so that primary repair was performed via extrapleural approach from mediastinum. An intraoperative positive pressure ventilation was avoided. The intubated patient after a successful anaesthesia and surgery without an extra complication was referred to neonatal intensive care unit. He was extubated in the postoperative 72th hour.

DISCUSSION

Esophageal atresia, being emergency surgery for neonatal period and life-threatening condition unless treated, has been found associated with prematurity in 30% of the cases like our patient according to the investigation of Blázquez et al[2]. Similarly, Petrosyan et al[6] have evaluated the medical records of the infants with esophageal atresia and tracheoesophageal fistula accompanied with low birth weight (1500g) and have concluded that prematurity and low birth weight are parallelly associated with morbidity and mortality. A successful anaesthetic management for such cases involves airway management, anaesthetic induction and monitorization and also control of postoperative trends as Broemling et al[7] have emphasized in their study. In our case, an uneventful management of airway was obtained by placing the endotracheal tube behind the fistula. Sharma et al[3] have pointed out that increased awareness of the anomaly provided diagnosis in very early term and a reduction in the pulmonary complications. In the same manner, our case was diagnosed due to the experienced inability in forwarding the aspiration catheter towards stomach and the 3-day old infant was operated.

CONCLUSION

As a conclusion, a safe anaesthetic management in the low birth weight neonates with esophageal atresia and tracheoesophageal fistula will prevent insufficient ventilation due to aspiration pneumonia, airway obstruction into the stomach due to fistula and size of fistula. We conclude that conscious intubation and one-lung ventilation (OLV) via fiberoptic bronchoscopy as well as intubation method that we have performed in our study will be safer in preventing complications.

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