

OXYGENATION OF A NEONATE AFTER ESOPHAGEAL INTUBATION

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INTRODUCTION

Even though esophageal intubation is a common event in anesthesia practice, frequently it is easily detected and resolved. However delayed detection of esophageal intubation can lead to many serious adverse events such as severe hypoxemia, cardiac arrhythmia, cardiac arrest and brain death. This is especially true in case of neonates who have to be intubated due to poor or no respiratory effort at birth. These neonates are usually premature and/or low birth weight and may require prolonged respiratory support. We present a case of a neonate in which esophageal intubation sustained oxygenation for a length of time, till the error was corrected and the tube placed in the trachea.

CASE REPORT

A call was received from the nursery to resuscitate a premature newborn baby delivered normally after a gestation of 32 weeks. When I arrived at nursery, the paediatrician had already undertaken the first resuscitative measures. As the baby was limp, cyanosed and had severe bradycardia at the time of birth, he immediately intubated the baby and started cardiac massage. Soon after resuscitation the heart

rate increased and baby started to become pink. The inflation pressure was however, high and there was poor air entry on both sides. Considering prematurity he was diagnosed to have respiratory distress syndrome (RDS) and all these findings were considered to be related to RDS. The paediatrician decided to provide mechanical respiratory support, for which I was called. When I arrived I inspected the baby to be pink but had peripheral cyanosis; the chest movements were satisfactory but not very good and the air entry was equal on both sides but decreased. After the intubation by the paediatrician, the process of calling the anaesthesiologist took about 30 minutes, and another 10-15 minutes passed in reaching the side of the infant and the discussion with the paediatrician. Before putting him on ventilatory support I decided to check endotracheal tube by direct laryngoscopy to ascertain its correct placement. On direct laryngoscopy, it was confirmed that the endotracheal tube (ETT) was in the oesophagus. The ETT was withdrawn and put in the trachea, patient was ventilated with AMBU® self-inflating reanimation bag and soon after, the inflation pressure was reduced, movements became good, and the baby became fairly pink with O₂ set 100%. Then baby was put on ventilator prophylactically and FiO₂ was reduced gradually to .21. The neonate was weaned off after 24 hrs with normal respiratory rate and SpO₂.

DISCUSSION

The incidence of esophageal intubation varies from 0.5% to 5% at different centres¹⁻². It is the unrecognized or delayed diagnosed esophageal intubation, which matters a lot due to its serious sequelae. The risk factors have been indicated as infant pa-

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tients (< or = 1 year of age), emergency operation and technique of rapid sequence induction with cricoid pressure. The experience of the operator is one important factor. The child specialists in our set ups have limited routine experience of neonatal intubation as compared to the anaesthetists; and the child specialists deputed for neonatal resuscitation are usually junior colleagues. Various methods of confirmation of correct placement of the tube are currently in use, including ETCO_2 , various devices comprising of rubber bulbs or syringes, fibroscopy and lately ultrasound help³. Grmec reported that capnography was the most reliable method to confirm esophageal intubation,⁴ since the CO_2 waveform generally decreases to zero, even if an initial pulse of swallowed CO_2 is sensed. However, repeated airway evaluations should be performed to prevent a misdiagnosis such as occurred in this case, rather than depending on capnography alone. The pure reliance on clinical judgment, as is in practice at our hospitals, is fraught with increased incidence of delayed diagnosis of esophageal intubation. Capnography itself is not an absolute assurance of correct placement. Moreover, carbon dioxide can be found in the stomach under certain circumstances. A difficult masked ventilation may force air as well as carbon dioxide into the stomach. The ingestion of carbonated beverages or carbonated antacids can also result in carbon dioxide in the stomach. Either of these could mimic a normal end-tidal tracing after esophageal intubation.

Sometimes, intubation with a double-lumen tube (DLT) is also associated with esophageal intubation. Junichi Ogata and his colleagues presented a case report of a patient who was ventilated after esophageal intubation with a DLT used like an esophageal-endotracheal combitube (EEC). She was a 66-yr-old female patient (155 cm, 74 kg, body mass index = 31) who was scheduled for thymectomy for grade-I myasthenia gravis. Although the DLT could not be advanced more than 21 cm from the patient's incisors, endotracheal intubation was assumed when spontaneous breathing re-appeared rapidly and capnography detected a normal CO_2 waveform. However, the patient could not be ventilated me-

chanically. Subsequent fibroscopy via the bronchial lumen revealed esophageal intubation. The bronchial lumen compressed the posterior wall of the esophageal inlet, while the tracheal lumen opened just posterior to the arytenoid cartilages. In this case, the DLT performed as an EEC⁵. In our case, the baby had been resuscitated through esophageal intubation and IPPV; hence the first possibility of tracheo-esophageal fistula was considered and the baby was investigated for that but was found to be normal. As the tube was held by the child specialist in between his thumb and index finger and the mouth of the newborn was closed, there is a possibility that the oxygen was being pumped in the esophagus through tube and was then diverting from the side of tube through the larynx into the trachea and oxygenating the newborn; due to which baby became partially pink and heart rate raised. The auscultated breath sounds were possibly transmitted sounds, that's why the air entry was equal on both side but decreased and having high inflation pressure. There was no marked distension of abdomen as it is a routine to pass the nasogastric tube in stomach. The devices to rule out esophageal intubation are not available and were not used. We rely only on clinical judgment. In this case the golden rule of 'when in doubt, take it out' was not observed by the child specialist, as he was quite sure that he had placed the tube in trachea. The possibility to the contrary never crossed his mind. Direct laryngoscopy by an expert laryngologist (the anaesthetist) confirmed the wrong placement of the tube, and subsequent correct placement in trachea corrected all the observations. The inflation pressure came to normal, the neonate responded well after careful ventilation and was extubated later on.

So the lesson to learn in that one should proceed in a systematic way, endotracheal tube should be passed and checked under direct vision, one should not jump on predetermined diagnosis and means of confirmation of correct placement of the tube must be at hand.

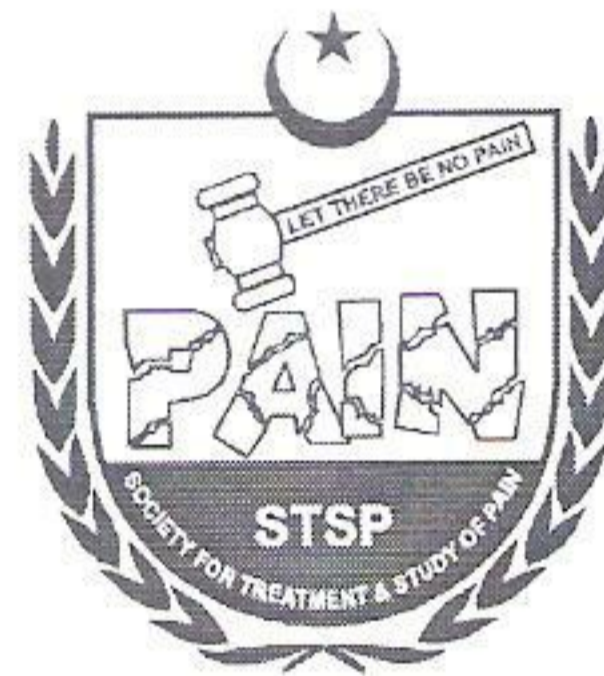
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