Acute Airway Obstruction and Tracheal Laceration during Gastrostomy Placement in an Infant with Tracheoesophageal Fistula

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Airway control is one of the most important tenets of anesthetic practice. Asphyxia and tracheal laceration in infants are extremely rare, but life-threatening, complications. Despite many reviews in the literature regarding tracheoesophageal fistula (TEF) and esophageal atresia, no case of tracheal injury following the aberrant passage of a gastrostomy catheter has been reported. The present case describes an unusual case of iatrogenic airway obstruction and tracheal laceration following placement of a gastrostomy catheter in an infant with esophageal atresia. In addition, we discuss a method to prevent this rare iatrogenic injury.

CASE REPORTS

A 2,410-g male infant was delivered vaginally at 37 weeks of gestation. Upon attempted passage of a feeding tube, it was noted that the tube was unable to be placed into the stomach through the esophagus. A diagnosis of esophageal atresia (Gross type C) was made by chest and abdominal radiographs, which demonstrated that the tube was coiled in the upper esophagus in association with air in the intestine distal to the stomach. No other anomalies were present. The 1-day-old infant was scheduled for TEF repair.

General anesthesia was induced with sevoflurane and oxygen without muscle relaxant. The trachea was easily intubated (3.0 mm endotracheal tube). Fentanyl 0.001 mg/kg was administered intravenously for perioperative anesthesia. The anesthesia strategy was to maintain anesthesia with sevoflurane and an air-oxygen mixture under spontaneous ventilation. The operation commenced with the passage of a gastrostomy catheter (6-French Phycon catheter; Fuji Systems Corporation, Tokyo, Japan) inserted into the stomach. The catheter was smoothly inserted to a depth of 25 cm through the abdominal and gastric walls. After the guide wire was removed, the balloon was inflated to anchor the tube. Shortly thereafter, no end-tidal carbon dioxide was detected, the oxygen saturation decreased below 70%, and the infant became bradycardic. Cardiopulmonary resuscitation was initiated promptly. Atropine 0.02 mg/kg and epinephrine 0.01 mg/kg were administered intravenously. Assisted ventilation with 100% oxygen was ineffective, and auscultation revealed absent breath sounds. We considered the following possibilities, using mnemonic DOPE: displacement or obstruction of the endotracheal tube, pneumothorax, and equipment failure. Displacement was unlikely, because the endotracheal tube was passed to the correct depth. The ability to easily pass the tube suggested no obstruction. Trial extubation showed the lumen of the tube was not obstructed. Finally, all equipment was performing correctly. Mask ventilation, however, was also ineffective. An attempt was made to place a new endotracheal tube, but it could not pass into the distal portion of the trachea. Pneumothorax was therefore suspected. A gastrostomy balloon was deflated as the first step to address a pneumothorax. This immediately facilitated ventilation and allowed the trachea to be easily intubated. We concluded that the catheter had been erroneously passed through the TEF and asphyxia was caused by airway obstruction following inflation of balloon in the trachea (fig. 1A). The period of apnea requiring cardiopulmonary resuscitation lasted 13 min and was associated with bradycardia without asystole. Following hemodynamic stabilization, the infant was placed on pressure-controlled ventilation. Arterial blood gas analysis revealed neither hypoxia nor hypercarbia. The infant was then positioned for a right thoracotomy. As the tracheal secretions were bloodtinged and the oxygen saturation had gradually decreased,
bronchial fistula (TEF). While the majority of tracheal lacerations heal with conservative management,\textsuperscript{10,11} they may be lethal if the airway is obstructed by a clot or if a pneumomediastinum develops due to a progressive air leak.\textsuperscript{12,13} In these rare cases, surgical repair is required.\textsuperscript{14}

This case would suggest that some procedure should be followed to ensure correct placement of the gastrostomy catheter. Correct positioning of the balloon has been reported to be ensured by performing the procedure under fluoroscopy. However, this results in exposure to radiation.\textsuperscript{15} Bronchoscopy could also be used to ensure the balloon is not in the trachea or major bronchi, but though several authors have demonstrated that intraoperative bronchoscopy is useful for rapid confirmation of correct placement of endotracheal tube and to avoid accidental intubation of the TEF,\textsuperscript{16,17} bronchoscopy in infants is technically complicated and involves essentially high-risk procedures that can result in serious complications such as hypoxia, bronchospasm, bleeding, pneumothorax, and arrhythmia.\textsuperscript{18,19} Therefore, given the disadvantages of the latter two diagnostic approaches, the awareness of the possibility of airway obstruction appears to be the most important factor in prevention of this complication.

In conclusion, in the rare situation when airway obstruction and tracheal laceration occurs in the setting of TEF treatment, knowledge of the possibility of this iatrogenic injury should aid in the prompt diagnosis and subsequent successful treatment of the injury.

### References

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