Ventilation Difficulty During Intraoperative Esophageal Dilation or Repair: Looking Beyond the Endotracheal Tube
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Introduction
Esophageal stenosis is a common complication associated with esophageal atresia repair surgery. While intraoperative complications are generally few during esophageal evaluation and dilation, potentially catastrophic complications may occur.

Case Report 1
A 5 month infant with history of AV canal s/p repair, dextrocardia, TEF s/p repair, severe right tracheobronchomalacia, and esophageal stricture was scheduled for esophageal dilation. Upper flexible and rigid esophagoscopy with wire passage and dilation through the stricture, along with gastrostomy dilation and retrograde flexible esophagoscopy were performed under fluoroscopic guidance. At the initiation of the procedure, ventilation became increasingly difficult. The endotracheal tube was suctioned, albuterol and additional vecuronium administered, and the trachea extubated and reintubated. Saturations remained depressed and PIP elevated. Significant crepitus in the neck and upper chest were discovered on chest examination and auscultation, suggesting subcutaneous emphysema. The patient was hemodynamically stable throughout and was taken intubated to the PICU postoperatively. Imaging revealed a significant pneumomediastinum and subcutaneous air.

Case Report 2
A 12 month male with a history of esophageal atresia s/p repair at 4 months developed esophageal stenosis requiring serial dilations. Esophageal perforation was suspected post dilation and confirmed on esophagram. The patient returned to the OR for esophageal exploration and repair. After failure to locate the perforation during VATS, flexible esophagoscopy was performed. Immediately following insufflation, ventilation became increasingly difficult with SpO2 and tidal volumes decreasing and PIP increasing. Confirming bilateral breath sounds, suctioning the ETT, 100% FiO2, decompressing the stomach via the g-tube, and albuterol failed to improve the ventilation. Surgery was abruptly concluded and the patient placed supine whereupon significant abdominal distension with obvious pneumoperitoneum were discovered. Needle decompression of the abdomen via the umbilicus immediately improved ventilation. A subsequent exploratory laparoscopy revealed a defect lateral to the esophagus in the left diaphragmatic crus. Drains were placed in the abdomen and mediastinum, the trachea extubated and the patient taken to the PACU after being deemed hemodynamically stable.

Conclusion
Anastomotic stricture following esophageal atresia repair occurs in 18-50% of children and infants (1,2), for which dilation is generally a safe and effective method for stricture management. While the major complication of esophageal perforation related to dilation is reported to be 0-14%, (3,4,5) other complications may occur that require the extensive evaluation of the entire patient. In the cases presented, ventilation difficulty stemmed from different etiologies despite a similar operative site. When such difficulty occurs, it is important to look beyond the endotracheal tube and realize that traumatic surgical emphysema may result in air tracking in several directions, including into the chest, head and neck, and abdomen.

References
1. Lang T, Hummer HF, Behrens R. Balloon dilatation is preferable to bougienage in children with esophageal atresia. Endoscopy 2001;33:329-35.