VIDEOSCOPY

An Invaginating Congenital Tracheal Diverticulum: The Importance of Routine Airway Evaluation

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Abstract

Introduction: Children with esophageal atresia (EA) often have concomitant airway pathology, including tracheoesophageal fistula (TEF), tracheobronchomalacia (TBM), and tracheal diverticulum (TD).[1,2] TD is rare and the incidence is estimated to be <1%. The hypothesized pathophysiology is because of a weakening in the tracheal lining resulting in an outpouching. Although largely asymptomatic, presence of a TD poses a risk for secretion accumulation with recurrent infection burden, and dangerous accidental intubation of the TD. Although some advocate for routine airway evaluation in all patients with EA, others perform it selectively, particularly in cases of long-gap EA (LGEA) thought to not have a TEF.[3] We aim to highlight the importance of a thorough preoperative airway evaluation in all cases of EA, as other entities besides TEF/TBM can exist altering LGEA management.

Materials and Methods: A 2-month-old male term infant with history notable for vertebral, anal, cardiac, tracheoesophageal fistula, renal, and/or limb defects anomalies, including unrepaired LGEA (Type A), underwent preoperative aerodigestive evaluation before LGEA management. Clinically, he had intermittent desaturations/tachypnea, requiring supplemental oxygen through nasal cannula. He underwent a three-phase rigid dynamic tracheobronchoscopy, flexible esophagoscopy, gapogram, and CT of the chest. Video of the bronchoscopy is provided.

Results: CT imaging noted a lobulated 4 mm soft tissue density projecting from the posterior tracheal wall of the upper thoracic trachea thought to be a focal mucus accumulation. Bronchoscopy identified a mid-tracheal soft tissue "mass" creating significant airway obstruction (80%–90%). With positive pressure ventilation, the "mass" self-everted to showcase its true nature: a TD that would invaginate into the trachea on exhalation and returning to diverticular shape with positive pressure. This was

confirmed on operative exploration where a true congenital diverticulum, entirely separate from the upper esophageal pouch, was identified and removed with a transverse tracheoplasty-type closure followed by posterior tracheopexy. Depending on the location of the TD, this can be done through a neck or thoracic approach. We chose to perform a right-sided thoracic approach. This can be completed thoracoscopically given the correct anatomical circumstances. We advocate for tracheopexy for several reasons: (1) to stabilize the tracheal suture line and help it heal; (2) given that we will be performing an esophageal anastomosis to treat the patient's EA, this prevents the risk for acquired TEF if the suture lines are in proximity; and (3) many of these children also have TBM and this aids in stabilization of the tracheal membrane. Alternative methods of management can involve plication of the TD without resection or endoscopic approaches with irritant/abrasive substances, yet this can lead to recurrence as the inner mucosa is not removed.

Conclusion: This video highlights the importance of thorough preoperative airway evaluations in all EA cases, as not only are TEFs important to identify, but also other significant airway pathology often coexists requiring treatment with the EA repair. Rigid ventilating bronchoscopy provides the ability to evaluate airway anomalies that may be missed or misdiagnosed without the ability to deliver positive pressure ventilation.

Authors have received and archived patient consent for video recording/publication in advance of video recording of procedure. Patient consent is within the medical record.

No competing financial interests exist.

Runtime of video: 1 min 56 secs

To be presented as a video presentation at the upcoming IPEG/ESPES Conference, July 2023.

Keywords: trachea, congenital, diverticulum, airway screening, invaginating

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