



Anesthetic Management for Clamshell Thoracotomy Resection of a Fetiform Teratoma Occupying the Entire Hemithorax Leading to Airway and Cardiac Compression



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Introduction

Teratomas are a rare type of germ-cell tumors often comprised of multiple tissue types from one or more of the three germ cell layers. The most common reported sites are sacrococcygeal (40%), ovary (25%), testicle (12%), brain (5%) and other (18%). Mediastinal teratomas are a rare presentation of teratomas associated with the same risks as other mediastinal masses. These risks include airway and hemodynamic compromise due to mass effect which pose significant anesthetic risks.

Understanding the relation of the mediastinal mass to the cardiorespiratory system, careful preoperative assessment, and meticulous planning are all crucial in the successful management of such patients. In this case report, we share our experience in anesthetic management for clamshell thoracotomy resection of a large fetiform teratoma occupying the entire hemithorax in a previously healthy 3-year old boy.

Case Presentation

A 3 year old boy presents with progressive shortness of breath and decreased activity level over the past 3 months. His mother had noticed that he had started laying on his right side in order to sleep. On exam, he appears to have increased work of breathing. Auscultation of his lungs revealed complete absence of breath sounds on the right side. Auscultation of his heart revealed distant heart sounds. Chest x-ray demonstrated complete occupation of the right hemithorax by a heterogeneous mass with mediastinal shift to the right side (Image A). A CT chest/abdomen with contrast demonstrated that the mass fills the entire right hemithorax and has several tissue densities within the mass. The mass was causing significant tracheal compression above the level of the carina and complete occlusion of the right main stem bronchus. The heart was displaced significantly into the left hemithorax with compression of great vessels and the right atrium (Image B).

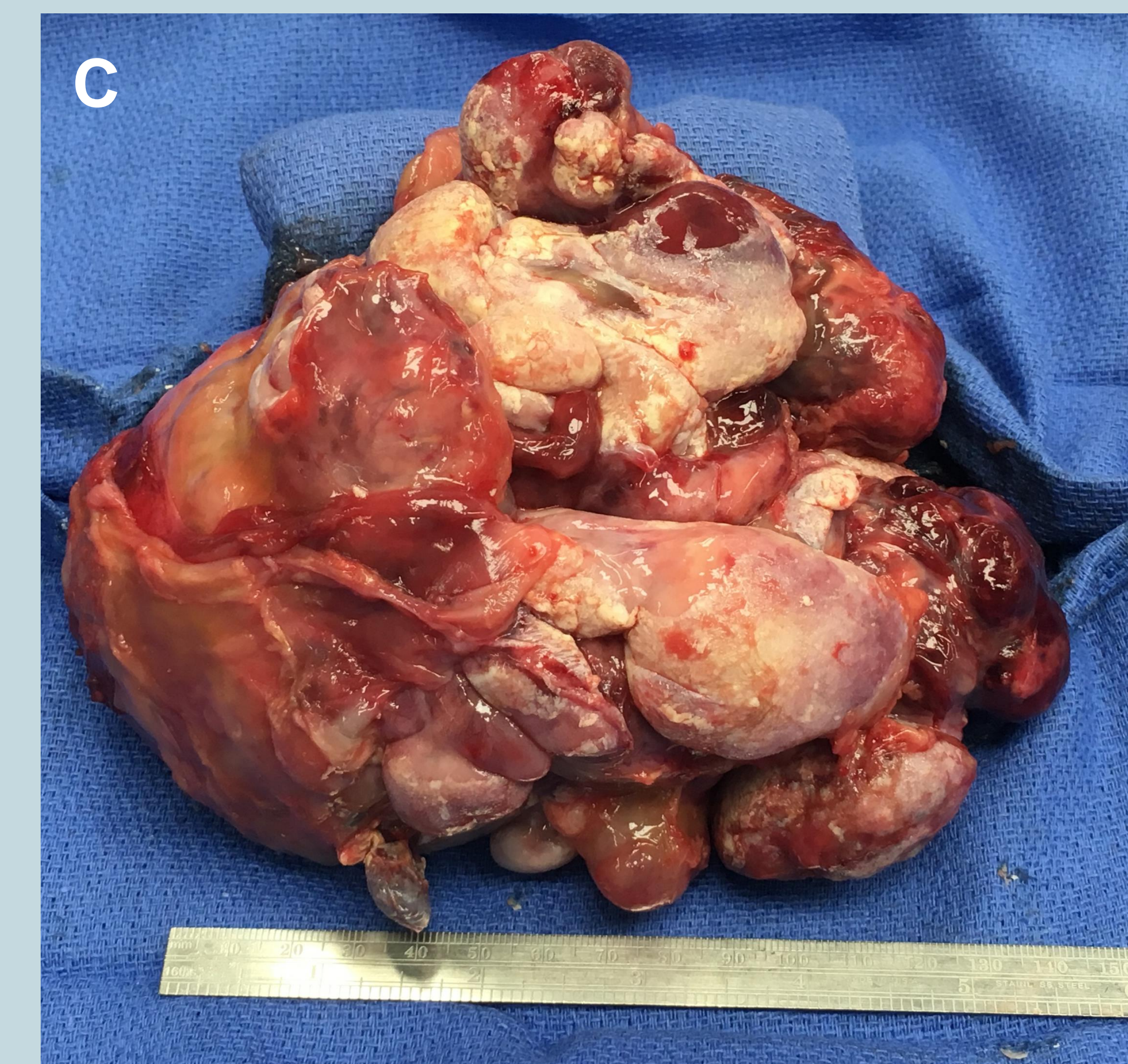
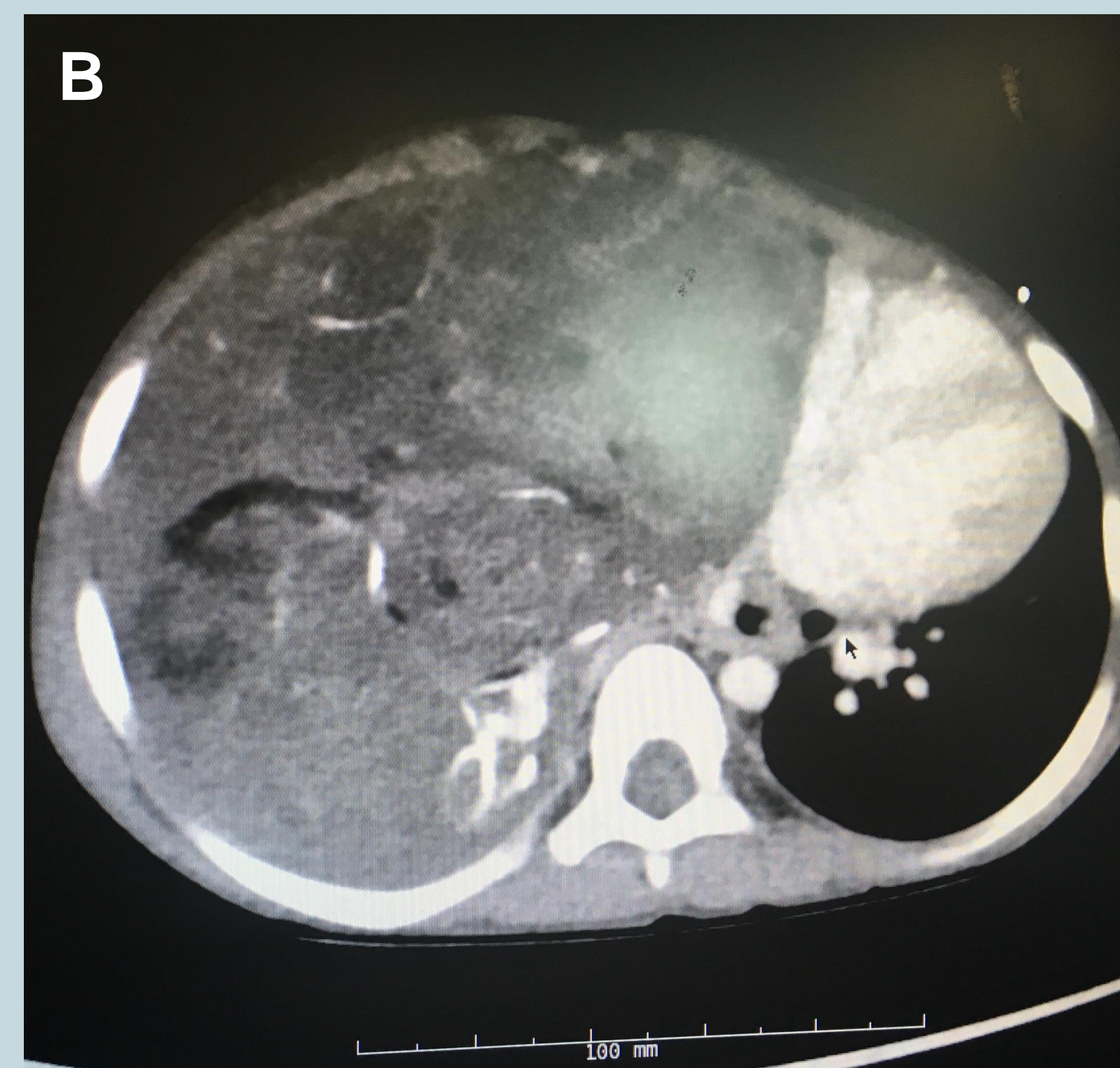
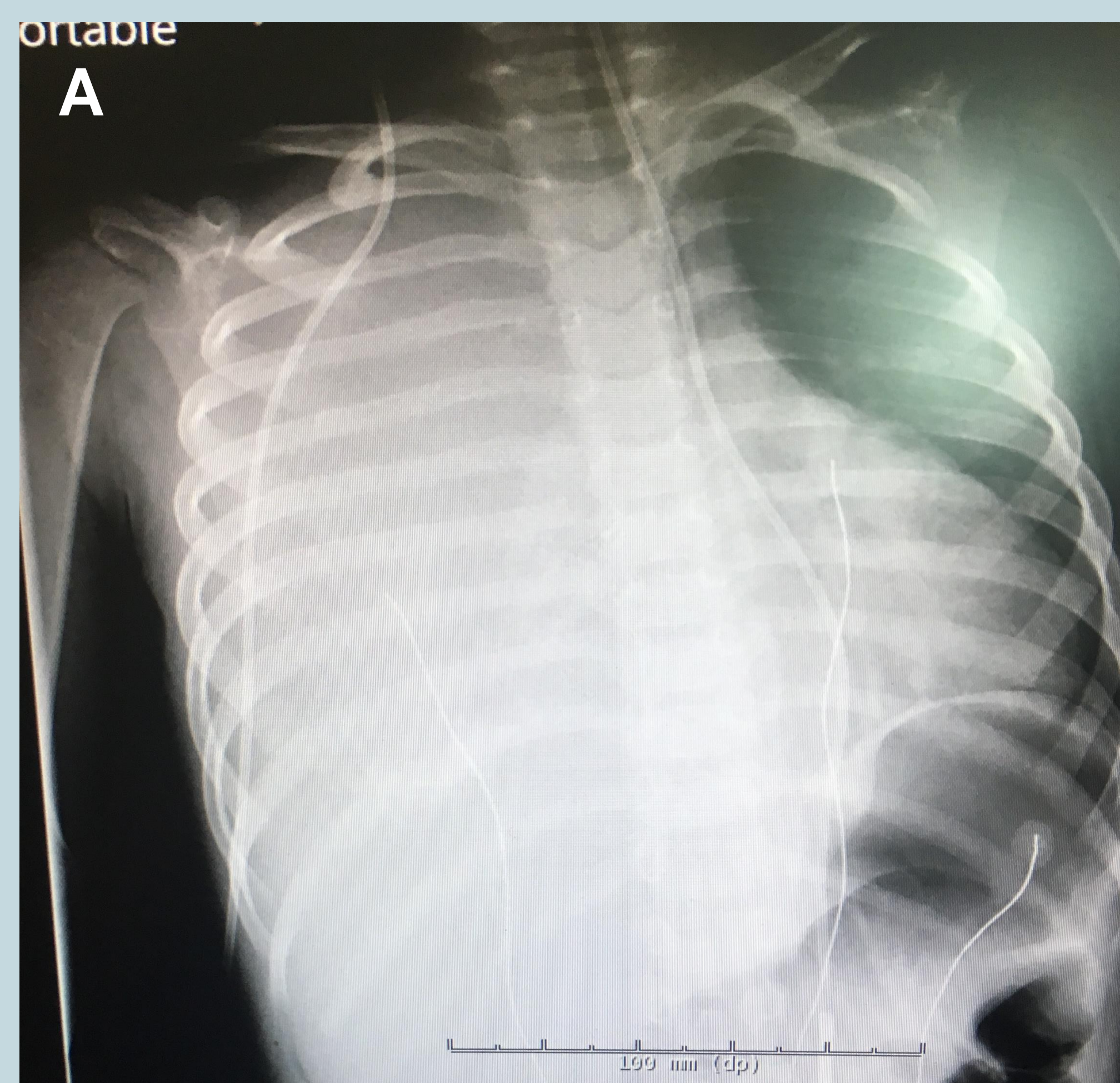
The surgical plan was clamshell thoracotomy for evacuation of mass by cardiac surgery. Due to the concern for airway and hemodynamic collapse on induction, rigid bronchoscopy, ENT surgery, and cardiac surgery with ECMO equipment were on standby during induction of anesthesia. Pre-induction IV access was present and the induction proceeded with mask induction maintaining spontaneous ventilation. The patient was deepened on sevoflurane and intubated without complications. Additional large bore IV access and an arterial-line were obtained post-induction. Surgical resection proceeded and a mass measuring 20 cm x 15 cm was removed from the thoracic cavity (Image C). The patient required intraoperative transfusions and remained hemodynamically stable. The patient was brought intubated postoperatively to the ICU, and a thoracic epidural was placed at the bedside post-op.

Mediastinal Masses

- As in adults, mediastinal masses are classified by their location within the mediastinum as either anterior (45%), middle (20%), or posterior (35%)
- In children, the most common tumor types associated with anterior mediastinal masses are lymphomas and germ-cell tumors
- Radiographic imaging plays an important role in the management of mediastinal masses and is essential in identifying possible cardiovascular or airway compression
- Up to sixty percent of patients with mediastinal masses are asymptomatic and are diagnosed incidentally
- Symptomatic patients may present with either respiratory (dyspnea, stridor, cough), cardiovascular (SVC syndrome), or non-specific symptoms (fatigue, confusion)
- Teratomas are classified as mature or immature based on the level of tissue differentiation
- Fetiform teratomas are a form of mature teratomas which include vertebral and/or long bone elements

Anesthetic Considerations

- In general, tumors in the anterior mediastinum are most likely to cause anesthetic complications
- Asymptomatic children may still develop catastrophic airway or cardiovascular compromise under anesthesia
- Children may present with symptoms of airway obstruction earlier than adults
- An interdisciplinary team discussion should take place to determine the best surgical approach, anesthetic management, and rescue therapies that should be available
- When able, good IV access, invasive blood pressure monitoring, and central access should be obtained based on the nature of the mediastinal mass and patient comorbidities
- In patients with concern for airway compression, awake fiberoptic intubation, maintenance of spontaneous ventilation, avoidance of muscle relaxants, positioning, and intubation distal to the compression should be considered.
- Rescue equipment such as rigid bronchoscopy or ECMO should be available in extreme cases



A) CXR depicting complete whiteout of R hemithorax with cardiac and tracheal shift to the Left. B) Chest CT demonstrating a large heterogeneous mass occupying the R hemithorax causing mediastinal shift to the L. C) 20 cm x 15 cm mass identified by pathology as a fetiform teratoma with many tissue elements including renal, hepatic, gastrointestinal and vertebral.