

# AIRWAY OBSTRUCTION DURING A DIAGNOSTIC CHAMBERLAIN PROCEDURE



David Leachman M.D. and Melinda King M.D.  
University of New Mexico Health Sciences Center, Department of Anesthesiology

## CASE REPORT

### INTRODUCTION

Patients with large anterior mediastinal masses are at great risk for respiratory obstruction with the induction of general anesthesia. Many clinicians agree that tissue biopsies should be performed under local anesthesia with minimal sedation. We present a case report of an adolescent male with a large anterior mediastinal mass who sustained an iatrogenic pneumothorax and subsequent inability to ventilate during a diagnostic Chamberlain procedure under local anesthesia.

### OBJECTIVE

To investigate the topics of preoperative evaluation and intraoperative management of anterior mediastinal masses in the pediatric population, and discuss the anesthetic management options in these patients including predictors of airway obstruction.

### PRESENTATION

The patient was a 13 year old, Native American male who had a history of excellent health. He presented to a pediatrician with cough, fever, headaches, sternal discomfort, shortness of breath and severe orthopnea. A prominent supra-clavicular fullness was noted on exam.

Radiographic studies demonstrated a very large anterior mediastinal mass. (Fig. 1,2). It was determined that a tissue biopsy would be required for diagnosis. Preliminary treatment with radiation and/or steroids would interfere with diagnostic techniques. The decision was made to proceed with a Chamberlain procedure (Anterior mediastinotomy).

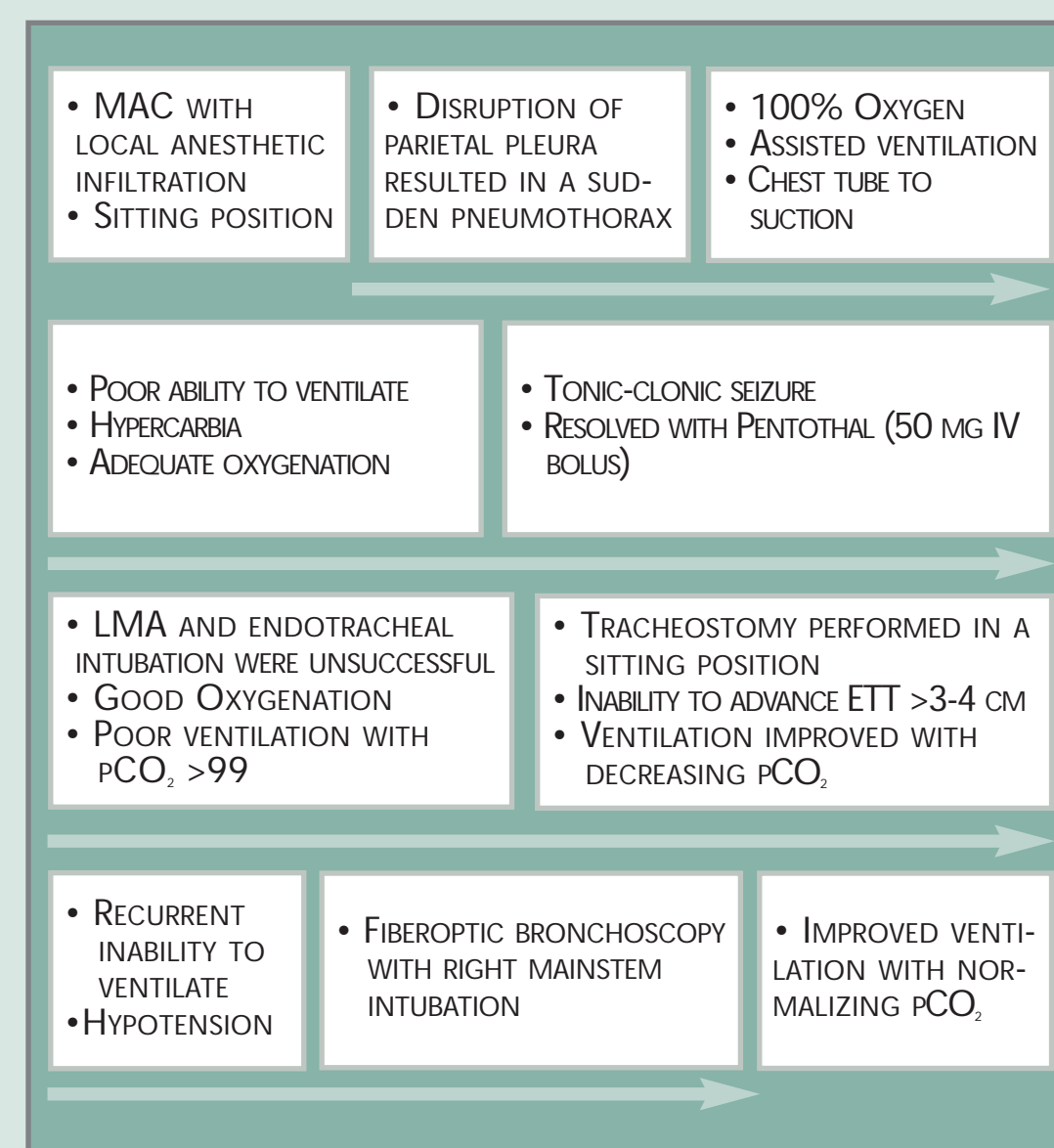


Figure 1: Mediastinal mass (13cm x 14cm x 13cm)

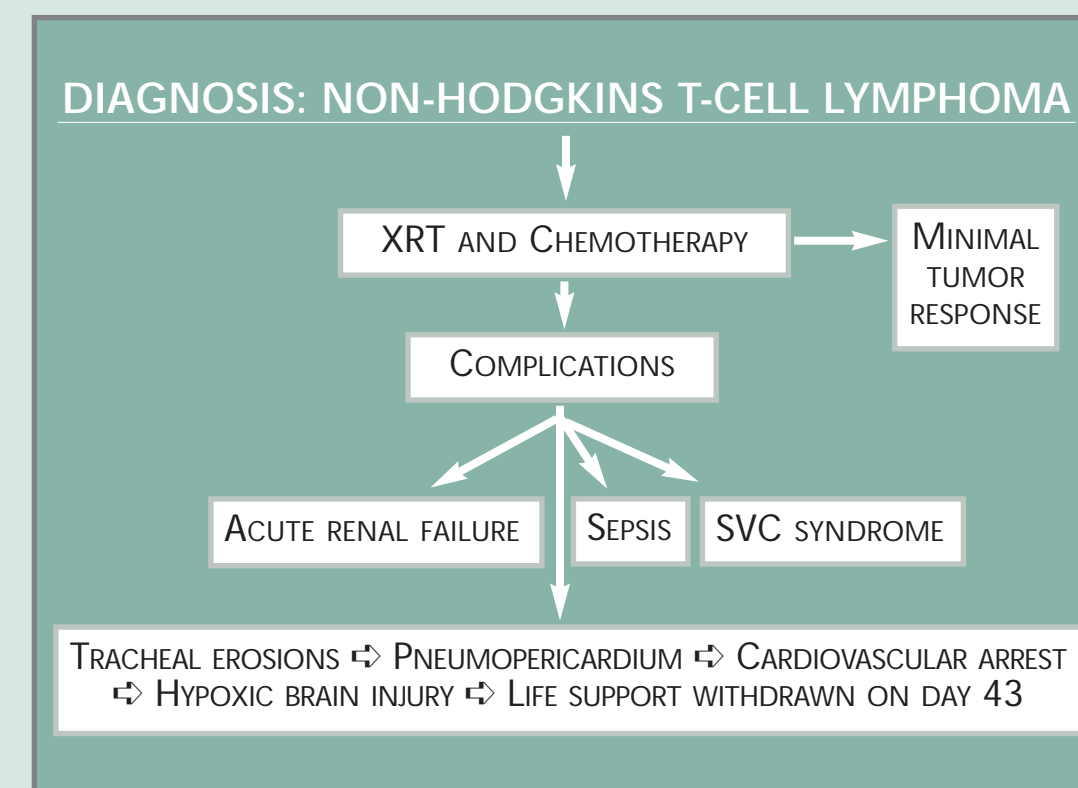


Figure 2: Tracheal compression (2mm diameter)

### OPERATIVE COURSE

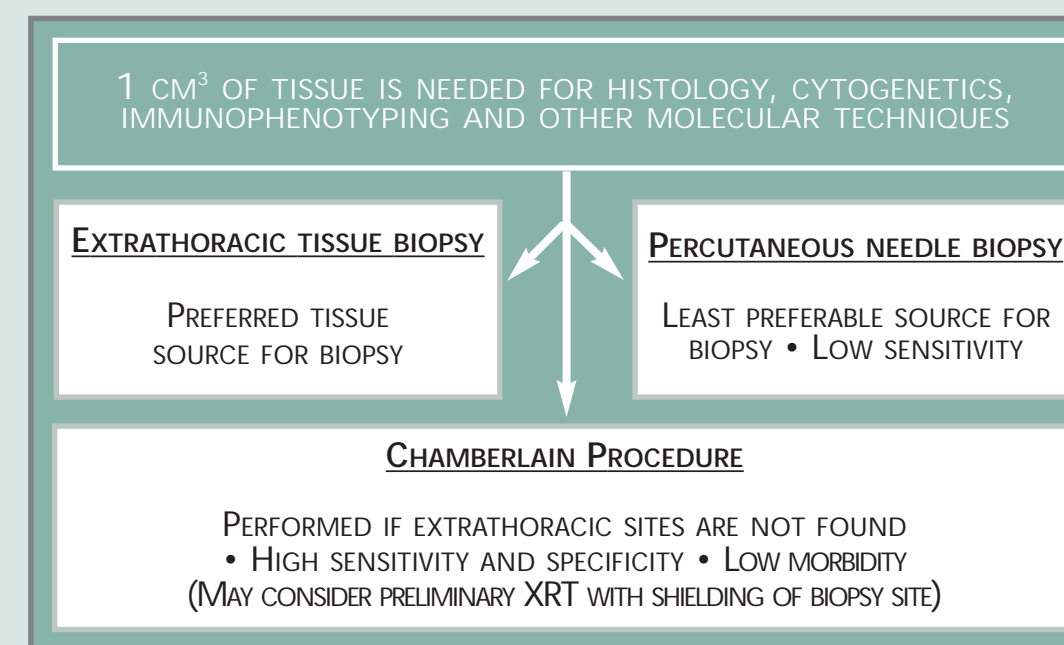


### HOSPITAL COURSE



## MANAGEMENT OF CHILDREN WITH ANTERIOR MEDASTINAL MASSES

### DIAGNOSIS



### RESPIRATORY OBSTRUCTION

#### WELL RECOGNIZED COMPLICATIONS OF ANTERIOR MEDASTINAL MASSES ON INDUCTION OF GENERAL ANESTHESIA

#### PATHOPHYSIOLOGY

- Decreased FRC
- Decreased compliance
- Cephalad shift in diaphragm at end expiration
- Compressed tracheal areas may be worsened with positive pressure ventilation
- Relaxation of bronchial smooth muscle leads to greater compressibility
- Positive pressure flow through a narrow area results in a turbulent flow

#### PREDICTORS

##### Respiratory symptoms

Respiratory symptoms do not correlate well with tracheal compression, and they do NOT identify those children with the greatest risk of respiratory collapse on induction of general anesthesia. However, orthopnea does correlate with a decrease of 50% in tracheal cross sectional area.

##### Radiographic evaluation

A chest CT is useful in defining the cross-sectional area of the trachea. Azizkhan et al., performed a retrospective analysis of 50 children, of which 13 children had cross-sectional areas less than 66% of predicted by age. 8 of 13 had general anesthesia, and 5 of the 8 patients had total airway obstruction on induction. All of these patients had cross-sectional areas less than 50% of predicted by age.

#### Pulmonary function evaluation:

Shamberger et al prospectively selected children with tracheal areas greater than 50% of predicted and peak expiratory flow rates greater than 50% of predicted (n=34) to proceed with induction of general anesthesia. They concluded that these were safe preoperative criteria for general anesthesia. There were no complications in this group.

### TECHNIQUES FOR GENERAL ANESTHESIA

#### Team approach to general anesthesia for pediatric patients with anterior mediastinal masses (Goh et al.)

- ENT surgeon (FOB, rigid bronchoscope)
- Cardiothoracic surgeon
- Cardiopulmonary bypass personnel
- Second anesthesiologist
- ALL PATIENTS with greater than 50% reduction in trachea cross-sectional area should have their femoral vessels cannulated prior to induction of anesthesia and prep those patients with <50% reduction.
- Large bore IV's should be started in lower extremities, because of likely SVC syndrome
- Arterial line
- Awake fiber optic bronchoscopy in sitting position, cautious with induction (No paralytics), advance tube into larger bronchus if necessary
- If unable to ventilate attempt rigid bronchoscopy and if unsuccessful initiate cardiopulmonary bypass

### CONCLUSIONS

- Pediatric anterior mediastinal masses are often rapidly progressive and life-threatening.
- Tissue diagnosis is crucial, and radiation or steroid therapy may destroy the opportunity for diagnosis.
- The Chamberlain procedure is safe and provides adequate tissue for diagnosis.
- MAC with local anesthetic is the preferred anesthetic in children with severe compromise.
- If general anesthesia is necessary then follow the recommendations of Goh et al.

### REFERENCES

- Azizkhan RG, et al. Life-threatening airway obstruction as a complication to the management of mediastinal masses in children. *Journal of Pediatric Surgery*. 1985 Dec;20(6):816-22.
- Glick RD, et al. Diagnosis of mediastinal masses in pediatric patients using mediastinoscopy and the Chamberlain procedure. *Journal of Pediatric Surgery*. 1999 Apr;34(4):559-64.
- Glick RD and La Quaglia MP. Lymphomas of the anterior mediastinum. *Seminars in Pediatric Surgery*. 1999 May;8(2):69-77.
- Goh MH, et al. Anterior mediastinal masses: an anaesthetic challenge. *Anaesthesia*. 1999 Jul;54(7):670-4.
- Loeffler JS, et al. Emergency prebiopsy radiation for mediastinal masses: impact on subsequent pathologic diagnosis and outcome. *Journal of Clinical Oncology*. 1986 May;4(5):716-21.
- Shamberger RC. Preanesthetic evaluation of children with anterior mediastinal masses. *Seminars in Pediatric Surgery*. 1999 May;8(2):61-8.
- Shamberger RC, et al. CT quantitation of tracheal cross-sectional area as a guide to the surgical and anesthetic management of children with anterior mediastinal masses. *Journal of Pediatric Surgery*. 1991 Feb;26(2):138-42.
- Venuta E et al. Ambulatory mediastinal biopsy for hematologic malignancies. *European Journal of Cardiothoracic Surgery*. 1997 Feb;11(2):218-21.