Incidental Anterior Mediastinal Mass in a Trauma Patent

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CASE

19 yo male with no significant PMH who was a restrained passenger in a MVA.

Imaging:
X-Ray- Left femoral shaft comminuted fracture & right ulnar styloid avulsion fracture.
CT scan C/A/P- Large anterior mediastinal mass 10.6 X 7.8 cm resulting in the compression of the right internal jugular vein and superior vena cava. A mass effect was noted on the trachea with involvement of the sternum. The patient was asymptomatic with no complaints of respiratory distress.

Physical Exam:
• **Airway:** Mallampati 1, Wilson 0-1. Adequate mouth opening. No loose/broken teeth
• **Lungs:** Clear bilateral breath sounds, no stridor or wheezing
• **Cardiac:** No murmurs or gallops, normal S1 and S2

Pre-operative Evaluations:
Orthopedic evaluation:
- Urgent repair of left femur with an intramedullary nail.

CT Surgery evaluation:
- Recommended neuraxial or regional anesthesia; since the mass was quite large and there was a risk of tracheal collapse with general anesthesia.
- Cardiopulmonary bypass (CPB) available; should regional anesthesia prove inadequate and the patient require airway protection.
- However, CPB was not suitable, since anticoagulation would be required for bypass, and our patient would be at increased risk of bleeding.

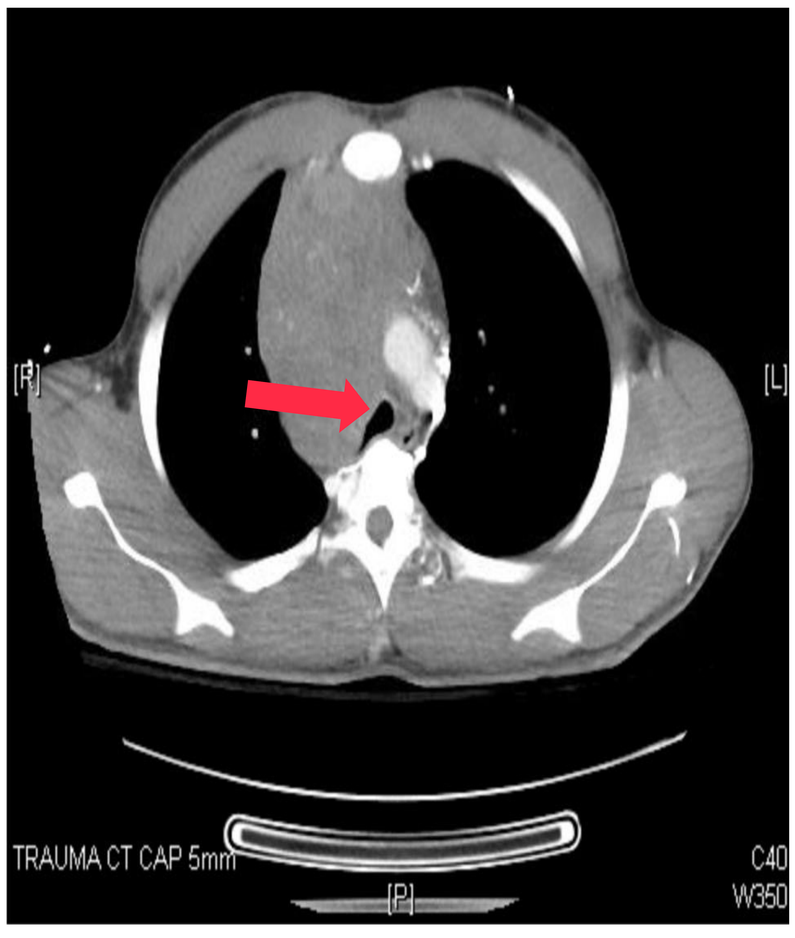


Figure 1 – Anterior mediastinal mass compressing the right mainstem bronchus.

INTRA-OPERATIVE COURSE

Anesthetic Type: Combined Spinal-Epidural
•To avoid airway instrumentation
•To prevent disturbance of the anterior mediastinal mass

Ketamine 30 mg IV was used to help alleviate the pain associated with positioning the pt into the right lateral decubitus position. However, he developed respiratory distress after administration and his oxygen saturation decreased to the mid-80s. At this time, an oxygen mask was utilized and his oxygen saturation quickly improved.

An epidural needle was placed at L2 and loss of resistance to air was noted at 5 cm. This was subsequently followed by the placement of a spinal needle and 0.75% bupivacaine (1.4 mL) was then injected into the intrathecal space. An epidural catheter was threaded to a depth of 10 cm from the skin and secured.

During the case, boluses of 2% lidocaine with epinephrine were administered via the epidural catheter. The case was completed without any complications and no additional analgesia was required.

Postoperative Course: Patient-controlled epidural analgesia (PCEA) with a continuous infusion of 0.125% bupivacaine and 2 mcg/ml fentanyl at 10 mL/hr was utilized with a demand bolus of 2 ml and a lockout interval of 20 minutes. Adequate postoperative analgesia was obtained with both the PCEA as well as IV acetaminophen every 6 hours. The epidural catheter was subsequently removed on postoperative day 1.

CONCLUSION

ANESTHETIC CONSIDERATIONS:
•SYMTOMS – Take a full history. Does the pt prefer one position over the other, can they lay flat, dyspnea, etc.
•CONSULT– With surgery and have CT surgeon PRESENT on induction.
•ALTERNATIVES – CPB vs PCPS
•PREPARATION – Have a rigid bronchoscope available prior to induction.
•INDUCTION - Always maintain spontaneous ventilation when possible.
•RISKS vs BENEFITS - Discuss with the patient the procedure and all possible outcomes.
•MULTI – DISCINIAPLARY APPROACH – involving experts in multiple fields.
***Only use General Anesthesia as a LAST resort ***

REFERENCES

1. http://pedsinreview.aappublications.org/content/pedsinreview/33/10/469/F5.large.jpg?width=800&height=600&carousel=1
2. http://www.openanesthesia.org/anterior_mediastinal_mass_effects/
3. https://www.openanesthesia.org/mediastinal_tumor_airway_obstruction/
4. http://felipeairway.sites.medinfo.ufl.edu/files/2011/05/Myths-of-AMM.pdf
5. Hines & Marschall: Stoelting's Anesthesia and Co-Existing Disease, 5th ed. 2008. Chapter 9
6. https://www-uptodate-com.proxy.libraries.rutgers.edu/contents/approach-to-the-adult-patient-with-a-mediastinal-mass?source=search_result&search=mediastinal%20mass&selectedTitle=1~122#H98070056
7. Gothard JW. Anesthetic considerations for patients with anterior mediastinal masses. Anesthesiol Clin. 2008 Jun;26(2):305-14
8. Robie DK, Gursoy MH, Pokorny WJ. Mediastinal tumors--airway obstruction and management. Semin Pediatr Surg. 1994 Nov;3(4):259-66.

BACKGROUND

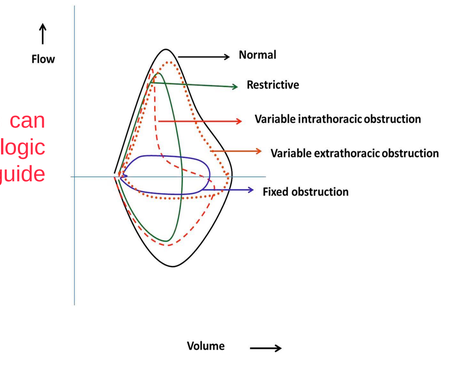
A large mediastinal mass can create challenges in anesthetic management; given its pressure effect on surrounding airway and cardiopulmonary structures. Thus, it is imperative to develop a stable plan which would ideally include preoperative testing and potential alternative options.

The mediastinum is divided into three compartments:[6]
Anterior: 50% of masses develop in this region; most are thymomas.[7]
Middle: This is the most common site for the development of lymphomas in young males.
Posterior: 20% of masses develop in this region; most are neurogenic in origin.[7]

Compressive symptoms: Range from mild cough to hypotension (ie. from tamponade)[8]

Airway collapse can result from either sedation, or from paralytic use, during the induction of GA. This is due to direct reduction in tracheobronchial diameter, increased compressibility of bronchi from smooth muscle relaxation, and a sudden drop in transpleural pressure gradient secondary to diaphragmatic paralysis.[5]

Figure 2 – Pulmonary function tests can help determine the pathophysiologic aspects of the mass and guide anesthesia.



CT imaging and symptom history are the most important factors for determining the safety of GA:
Safe: An asymptomatic adult with <50% tracheobronchial obstruction (TBO) on CT.[2]
Unsafe: Severely symptomatic adult/child, or child with >50% TBO on CT.[2]
Equivocal: Mild/moderate symptomatic child with <50% TBO on CT. Mild/moderate symptomatic adult with >50% TBO on CT; unable to give history.

Typically, obstruction occurs distal to the ETT thus making it impossible to force the ETT past it. If the mass is very proximal on CT, then awake fiberoptic intubation is a good option. If proximity is uncertain, then local and regional techniques should be employed where possible. Consideration should be given to maintaining spontaneous ventilation utilizing an inhalational induction.

DISCUSSION

The presence of a mediastinal mass creates a certain degree of challenge for the anesthesiologist. Managing both the airway and ventilation are the primary concerns. However, in this case of an incidentally-found mediastinal mass, we determined that the patient must be medically optimized.

If GA is not necessary, consider utilizing a regional technique as an alternative. However if GA is necessary, based on history, CT imaging, location of the mass, size of the mass, and PFTs, then one should evaluate whether mask ventilation and/or hand-assisted ventilation would be possible. If mask ventilation is possible, proceed with GA. If mask ventilation is impossible, consider CPB on standby vs percutaneous cardiopulmonary support (PCPS). The disadvantage to CPB on standby is that it would take approx. 5-10 mins to access the chest and insert cannulas; while the patient remains anoxic. This could result in profound neurologic injury.

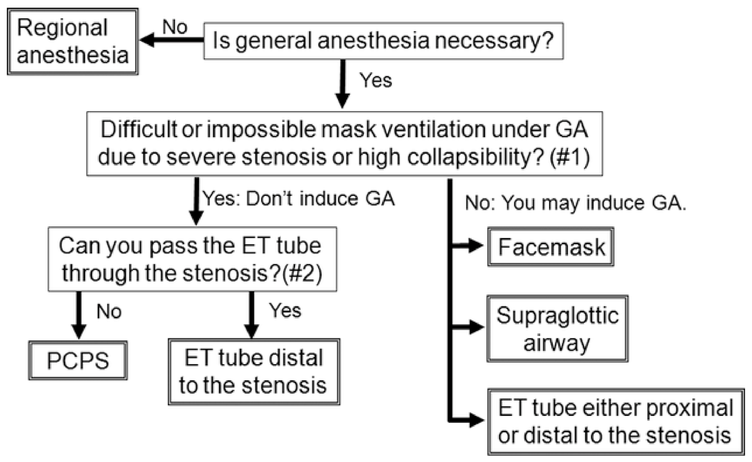


Figure 3 – Algorithm to manage a mediastinal mass.

In our case, the patient's history was an "exception" as he remained completely asymptomatic in spite of the large anterior mediastinal mass. The urgency for the surgical intervention, in this trauma patient, also prevented full medical optimization of the mass prior to surgery.

Additionally, the "backup plan" of having CPB on standby, had the airway been compromised, posed a challenge regarding the nature of the surgery itself. Since the surgical intervention was orthopedic, the risk of bleeding was high. Thus, bleeding would have been significantly increased with heparinization; as required for CPB.

Lastly, the combined spinal-epidural technique provided adequate intraoperative analgesia without the risk of airway compromise. It also provided sufficient post-operative analgesia without respiratory depression.