

## PBLD Case Skeleton

### **“You’ve GOT to see this CT Scan!” – Rapidly Expanding Recurrent Neck Mass in a 10 Month Old**

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#### **Objectives:**

1. Review etiologies of rapidly expanding neck masses in infants and children.
2. Formulate an ideal approach and back-up strategies for preoperative transport and management of anesthetic induction in an infant with a rapidly expanding neck mass.
3. Develop an emergency strategy for loss of airway in the patient with a rapidly expanding neck mass.
4. Discuss operating room, surgeon, and communication factors that affect caring for a critical airway.

#### **Case History:**

A previously healthy 10 month old 8.8 kg girl with a history of glass ingestion presented with fever, decreased PO, stridor, and respiratory distress. Initial CT scan demonstrated retropharyngeal abscess for which she underwent microlaryngoscopy/bronchoscopy (MLB), rigid esophagoscopy and incision and drainage (I+D). On postoperative day 1 she was extubated uneventfully. On postoperative day 2 she was noted to have increasing fussiness throughout the day, and at 16:30 she was continuously fussy, refusing PO intake, and in a sitting position with her neck extended. At 20:29 CT scan revealed:



**Questions:** What are potential etiologies for neck mass in an infant or child? How does the differential change for a rapidly expanding neck mass? How does this patient's history alter the differential? How does the imaging? How will you approach this case at this moment in time, given the information you have now?

**Case Progression:**

On evaluation, the patient was found to be ill-appearing, irritable, drooling, sitting quietly in mom's arms. She was easily agitated with any caregiver presence. Significant muffling of her cries was observed from the door, worsening with each audible cry. The surgeon would like to proceed to the OR immediately.

**Questions:**

What is your ideal approach for evaluating this patient preoperatively? What would you ask for from the PICU team and nursing team preoperatively? What is your plan for transport to the OR? What is your plan for transition to the operating room?

**Case progression:**

Quick review of the chart at the pt's bedside reveals that she had a prior anesthetic two days ago for initial drainage of her retropharyngeal abscess. She had high-dose dexmedetomidine infusion over 15 minutes, ketamine 2 mg/kg IV, and topical lidocaine prior to intubation by fiberoptic bronchoscopy. "Attempt x1 grade 2 view." As you are reviewing the chart, you can hear the patient's occasional cry with increasing muffling and "hot potato" quality.

**Questions:**

What is your approach for induction? What equipment, drugs, and personnel would you plan for in the OR? What is your back-up strategy?

**Case progression:**

Pt is brought to just outside the OR door by Mom without monitors or any handling by caregivers. The "time out" was performed just outside of the OR prior to separation from Mom and patient was carried into the OR by Anesthesiology attending. Fentanyl 0.5 mcg/kg administered immediately and seated upright, neck extended gentle mask induction was performed. Repeat fiberoptic bronchoscopy in optimal position (by same operator) revealed no view of posterior hypopharynx, tonsillar pillars, epiglottis, airway or any recognizable airway structures. Four-hand mask ventilation still possible but becoming increasingly difficult/requiring more pressure.

**Questions:**

What is your next step? Alternatives? How does the difficult airway algorithm and pediatric considerations of the algorithm guide you?

**Case progression:**

Direct Laryngoscopy by the attending anesthesiologist yields a grade 4 view, with only 1 small (2 mm) black "space" between the mass (posterior) and anterior tissue

(unrecognizable anatomy). Passage of ETT through that black space yields no breath sounds. ENT surgeon with 11 blade and sterile glove reaches into the hypopharynx during anesthesiologist's direct laryngoscopy. Blind puncture of huge posterior mass relieves some air and improves view to grade 3 (anterior tissue = swollen, round epiglottis, no view of arytenoids or cords). Passage of ETT on this attempt was successful. Surgical team proceeds with I+D of mass which yielded >20 cc of pus as well as copious amounts of air. Patient was taken to ICU intubated and maintained on PSV during continuation and tailoring of antibiotic therapy prior to extubation. Patient made a full recovery and suffered no sequelae as a result of this case.

### **Discussion:**

Pediatric neck masses have a wide differential diagnosis, broadly divided into Congenital neck masses (branchial cleft cysts most commonly, thyroglossal duct cysts, cystic hygromas, laryngoceles, dermoid cysts, teratoma cysts, thymic cysts, mucoceles and hemangiomas), Acquired neck masses (thyroid masses, thyroid nodules, malignancies including lymphoma, rhabdomyosarcoma, neuroblastoma, melanoma), and Reactive/Infectious causes of cervical lymphadenopathy (most common- lymphadenitis due to staph or strep; many other bacterial, viral, fungal, mycobacterial, protozoal origins)

Rapidly expanding neck masses are usually infected or hemorrhagic, though this does not alter the differential generally speaking because many congenital or acquired masses present while acutely infected or bleeding. History and physical exam is critical to narrowing down the diagnosis as well as to guide imaging. CT is the most common modality for evaluating neck masses, MRI is more valuable for evaluation of the extent of soft tissue involvement, and US can be useful depending on patient age/cooperation and technician experience. In this case, with a known history of retropharyngeal abscess the overwhelming most likely diagnosis is continued infection; however the CT images obtained suggest a significant component of trapped air that is inconsistent with previous studies and suggests a new problem. The critical pieces of information for this patient are (1) the rapidity with which she presented with worsening symptoms and (2) the images provided in the case summary showing a 2-6 mm airway. It is critical to (1) assume care of the patient in the operating room (preferably) as safely and expeditiously as possible before decompensation or loss of airway and (2) enlist the help of surgical and nursing colleagues to develop an emergency plan.

Given the tenuous status of this patient's airway by CT (performed 4 hours prior) and her current evolving physical exam, preoperative preparation and evaluation of this patient should be kept to a minimum. It is critical to gather a team capable of handling an airway emergency (surgical or otherwise) immediately and have a plan in place according to the patient's specific needs and in consideration of the Difficult Pediatric Airway Algorithm. Regardless of the strategy employed for securing this patient's airway, communication is paramount, involving the team who is caring for the patient currently (PICU), who will be assuming care of the patient (ENT Surgeon

and Anesthesiologist), and nursing teams in the PICU and OR. Consideration of a tracheostomy or cricothyroidotomy kit and surgical team immediately available at all times is warranted given the size and evolving nature of the patient's condition.

Transport is a critical component of patient management and the balance between getting her to a familiar surgical environment capable of handling any airway emergency versus the risk of the transport itself must be critically weighed. In any case, communication with the OR and surgical teams is critical, as well as continuous presence of staff and equipment capable of dealing with a true airway emergency. Occasionally, alternative means for transport, entry into the operating room, placement of monitors, performing the "time out" must be adjusted so as to conserve the patient's tenuous medical status. Communication about the specific steps to be performed, when each step is to occur and who will be performing what task(s) is critical to successful crisis management.

#### **References:**

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