Pediatric intensive care management of an immune deficient child with epiglottitis, meningitis, thrombocytopenia and DIC

Jennifer K. Hansen MD, Lawrence Schwartz MD, Children’s Hospital Colorado, University of Colorado


Objectives

1. Present the case study of a patient requiring emergent intubation in an offsite location with an unexpected finding of epiglottitis, followed later by tracheostomy to secure the airway.

2. Present the management of a complicated Pediatric ICU patient with multiple organ system dysfunction.

3. Review management of acute and refractory elevated intracranial pressure, and the risk vs benefit of invasive intracranial procedures.

4. Implications

- Although pediatric epiglottitis is uncommon, the mortality rate of children whose airway is not secured by endotracheal intubation is as high as 10% (5). The ideal place to achieve endotracheal intubation when epiglottitis is suspected, is not in the intensive care unit, but in the operating room. In case intubation by direct laryngoscopy is unsuccessful, and rigid bronchoscopy or emergent tracheostomy is required (3,6).

- Stroke can be one of many inciting events leading to cerebral edema and increased intracranial pressure. Urgent treatment to avoid further brain injury may include invasive surgical intervention (1).

- The pediatric intensivist emphasizes interdisciplinary communication that includes parents in the plan of care (4).

5. References


- http://www.pediatrics.org/cgi/content/full/2010/108/1065


Case Report

A 4 year old child with an ill-defined immune deficiency was admitted to the Pediatric Intensive Care Unit at Children’s Hospital Colorado with symptoms of head and neck pain concerning for meningitis, nausea and vomiting, and lymphadenopathy.

PMH was significant for previous meningitis x 2 and epiglottitis x 1 requiring temporary tracheostomy (now closed), idiopathic thrombocytopenic purpura, lymphadenopathy, and chronic upper airway obstruction requiring nasal CPAP at night, chronic steroid use.

Upon arrival, she was breathing spontaneously with bag mask assistance, and had a Glasgow Coma Scale of 6

Epiglottitis was suspected based on appearance during direct laryngoscopy. Direct visualization by ENT consult also confirmed the appearance of inflamed and massively swollen airway structures. The patient was not extubated until a tracheostomy was performed 10 days later.

Management of cerebral edema and elevated Intracranial Pressure

Initial presentation and management of elevated intracranial pressure, anemia, and coagulopathy of this patient:

- Neuro: Initial GCS 6. Fixed dilated right pupil not present on initial exam.
- CT scan head (see image below) - right cerebellar stroke.
- Neurosurgery consult: risk vs benefit of invasive ICP monitoring in the setting of ITP and anemia. Final decision: EVD placement.
- Hypertonic saline 3% bolus 5 ml/kg, twice, then drip until Na 145.
- q 15 minute ICP checks.
- HB 30 degrees.
- Serial neuro checks.
- Mannitol bolus x 1.
- Midazolam and fentanyl infusions
- Day 2 Neuro. MRI head (see image below) abrupt rise in ICP
- Patient position optimized. HBO 45 degrees (previously 30 degrees).
- CSF drainage from EVD. Mannitol bolus x 1, hypertonic saline 3% bolus. CSF replaced 1:1 with normal saline.
- Risk vs benefit of emergent decompressive craniectomy vs no invasive intervention in the setting of imminent herniation. Final decision: emergent decompressive craniectomy.
- SEE monitoring started after craniectomy.
- GV: goal normotension, avg 110-120/60-70.
- Pulm: Vc 7 ml/kg, PEEP 7, RR 22, goal: eucapnia, PCO2, 35-40 mm Hg.
- Home: Invasive lines placed. Significant oozing noted from line sites, nose and mouth.
- CBC: wbc 19.2, Hb 9.2, Hct 27.0, PTT 17
- INR 1.7, PTT 57
- Na 132, K 4.4, Cl 101, CO 25, BUN 11, Cr 0.32, Glu 186
- 1 unit PRBC, 170 ml FFP and 3 RDE platelets given.
- ENT packed nose and gums with flowseal
- Immune: IVIG 1 g/kg and methylprednisolone 2 mg/kg
- Endo: stress dose of hydrocortisone 6 hrs. 

Airway management of this patient:

- Ability to bag mask the patient was established.
- Visual inspection revealed right neck lymphadenopathy, and a tongue laceration.
- Pulse oximetry, NIBW and cardiac monitoring placed.
- Airway equipment and suction prepared.
- Personnel available: Anesthesia and PICU team.
- Pre-oxygenation with 100% O2.
- Rapid sequence intubation with midazolam, fentanyl and rocuronium IV.
- Direct laryngoscopy by the most experienced airway person. Grade III view of swollen epiglottis.
- Intubation with styletted tube 1st attempt.
- Confirmation of tube placement with capnograph and bilateral auscultation of the chest.
- Tracheostomy in OR 10 days after admission.

Brain swelling: The goal in management of brain edema is to prevent herniation. The initial treatment of elevated ICP is typically non-invasive. The aim is to achieve normovolemia, normocapnia, and normoglycemia. The most critical is control of ICP.

- Hyperventilation: The initial goal of hyperventilation is to achieve normocapnia (delta PCO2 < 5-6 mmHg).
- Mannitol: Mannitol (1-2 g/kg over 20 minutes) may be used in refractory brain edema.aniu edema in the setting of ITP and anemia. Final decision: EVD placement. Final decision: emergent decompressive craniectomy.
- Hypertonic saline 5-10 ml/kg over 5 to 10 minutes, and/or mannitol 0.25-1 g/kg over 10 to 20 minutes.
- Maintain normocapnia and normonatremia. Na > 135 mmol/L
- Head midline and elevated 30 degrees maximizes venous return and decreases ICP.
- Temperature control.
- Hyperthermia increases cerebral metabolic demand.
- CSF drainage. External ventricular drain or lumbar drain if there is no evidence of mass lesion or midline shift.
- Ceftriaxone. Pediatric data is lacking.
- Barbiturate coma. Consider in cases of refractory elevated ICP.
- Decompressive craniectomy. Evidence of cerebral herniation and GCS < 3 on at least one occasion.

References


