

PBLD

The Fast and the Feverish

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Objectives:

- Develop differential diagnosis and differentiation of hypermetabolic states
- Review anesthetic implications of dysautonomia
- Describe etiology and management of supraventricular tachycardia
- Understand implications of improper charting that may affect future anesthetic management

Case history:

A 4 y/o 10kg female with history of pilocytic astrocytoma, developmental delay, and dysautonomia, and multiple ventriculoperitoneal shunts (VPS) is brought to the emergency center for increasing lethargy and abdominal distention. A CT scan of the head confirms increasing ventriculomegaly and a shunt series by radiography confirms distal VPS obstruction. Because she has had numerous VPS revisions and the associated abdominal distention, the neurosurgery service decides to place a ventriculoatrial shunt (VAS). The intraoperative course is complicated by persistent tachycardia with HR in the 160s and EtCO₂ in the 50s with controlled ventilation, for which she received Morphine 3mg. She is extubated at her baseline and transported to the PACU for recovery.

Questions:

Do you have any concerns?

Case progression (continued):

Approximately 15 minutes into the PACU course, the nurse calls you with the following vital signs:

HR: 165, BP: difficult to obtain, RR: 32, SpO₂: 99% on RA, T: 101.5

Questions:

Do you have any concerns?

Case progression (continued):

Since you are on call and in another OR, you order an antipyretic and continue with your other case. Approximately 15 minutes following the initial phone call, the PACU nurse grabs your colleague for fussiness. Your colleague prescribes Morphine 0.5mg for pain. She subsequently

calls you approximately 5 minutes after that Morphine dose for what appeared to be a seizure. Her vital signs are:
HR: 180, BP: difficult to obtain, RR: 32, SpO2: 90% on RA, T: 102.5

Questions:

How do you differentiate a febrile seizure from a non-febrile seizure? How do you treat a febrile seizure?

What are immediate causes of post-operative fever?

Case progression (continued):

The PACU nurse administers Versed 1mg. The child is now somnolent, hypotonic, and still febrile.

Questions:

Would you intubate this child? Would you place a capnograph?

Case progression (continued):

Upon arrival you notice a child that is responsive to sternal rub only. The child's HR increases from 180 to 220 with no discernible P-waves.

Questions:

How do you differentiate atrial tachycardia from a supraventricular tachycardia or ventricular tachycardia? What maneuvers can you use to differentiate the rhythm? Would you shock this rhythm? Would you use a beta-blocker? What is the differential diagnosis for a supraventricular tachycardia? Could a ventriculoatrial shunt produce this rhythm? How do you assess the patency and location of the shunt?

Case progression (continued):

A bag of ice is placed over the child's face and Adenosine 1mg is administered and the HR decreases from 220 to 180 with discernable P waves. The neurosurgery service is called to the bedside to the shunt. The shunt is patent with appropriate proximal withdrawal and distal flow. An AP radiograph shows the shunt in appropriate location at the SVC/right atrial junction.

The child's vital signs now are:

HR: 180, BP: difficult to obtain, RR: 30, SpO2: 95% with 5L non-rebreather mask, T: 104.5.
The child is still somnolent and hypotonic.

Questions:

What is your differential diagnosis? How would you reduce this child's fever? What additional studies would you obtain to help with the differential diagnosis? Would you place additional monitors and access?

Case progression (continued):

You electively intubate this child and place a femoral arterial line and foley catheter with red urine. The initial capnograph show an EtCO₂ of 102mmHg. Is this malignant hyperthermia? How do you differentiate malignant hyperthermia for other hypermetabolic states? How do you treat malignant hyperthermia? What additional studies may aid in diagnosing malignant hyperthermia?

Case progression (continued):

You are able to hyperventilate the child with controlled ventilation to an EtCO₂ of 45mmHg, but the child's temperature continues to increase to 105.1. The child has a generalized tonic-clonic seizure that is treated effectively with Valium 1mg. The child is transported to the PICU where the fever defervesces to normal over the next 24 hours, and the child is extubated 2 days after admission. The hyperpyrexia episode is labeled as malignant hyperthermia by the PICU attending, which is further perpetuated by the neurosurgery attending.

Questions:

What is the dysautonomia? What are the clinical symptoms of dysautonomia? Who is at risk for developing dysautonomia? What is the management of dysautonomia and a dysautonomic crisis?

How do you correct medical errors in the chart that are chronically perpetuated? How do you prevent inadequate labeling of this child?