

## **PBLD Table # 34**

**Title:** A pediatric patient with benign intracranial hypertension and a post dural puncture headache: Should we do an epidural blood patch?

**Presentation Date/Time:** Sunday, March 9, 2014; 7:00-8:10am

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### **Learning Objectives:**

1. Diagnose post dural puncture headache in a patient with history of chronic headaches and idiopathic intracranial hypertension
2. Develop a plan for the management of a postdural puncture headache in children
3. Describe the pathophysiology of a postdural puncture headache
4. Review the current literature regarding the use of epidural blood patch in the pediatric patient with a post dural puncture headache.

### **Case history:**

An 11 year old, 45 kg, male patient with history of idiopathic intracranial hypertension (IIH, pseudotumor cerebri) with a headache is referred to the anesthesia team for administration of a blood patch for new onset severe headache (pain score 10/10) following a diagnostic lumbar puncture. The child has an in situ ventriculo-peritoneal shunt that was placed more than a year ago.

#### Questions:

What is Idiopathic intracranial hypertension? What are the causes? What is the treatment of this condition?

What further history will you want to ask?

#### Case history:

The child originally presented to the hospital 4 days before this clinical encounter, for severe headache and retro-orbital pain and underwent a diagnostic lumbar puncture under sedation (22G spinal needle, L4-5 interspace, opening pressure of 17cm H<sub>2</sub>O). At that time 10 ml of CSF was removed under sedation, and the closing pressure was 16 cm of H<sub>2</sub>O. He also underwent a head CT scan and shunt series showing stable ventricular size and no discontinuity of the shunt system. Family was reassured that the shunt was adequately functioning and discharged home with follow up appointment with neurologist for further management of headaches. The patient seemed to have mild positional headache on the day following the procedure, but by morning, he was ambulating and tolerated per oral feeds and discharged home. Following discharge, the mother called to say that the headaches were now getting worse; they were positional and initially relieved by lying flat.

#### Questions:

What is your differential diagnosis? What is the incidence of post dural puncture headache in the general vs the pediatric population? What are the signs and symptoms of a post dural puncture headache? What is the cause and mechanism of post dural puncture headache?

Case progression:

The parents and the child were explained the working diagnosis. They were explained the management options – conservative and non-conservative options. He was being managed conservatively by increasing oral fluids intake, caffeine, and acetaminophen. Following failure of conservative management, the neurosurgical team now requests an epidural blood patch.

Questions:

What is the initial management of a post dural puncture headache?

What is your response? What is your further plan of action?

Case progression (preanesthesia evaluation history):

Upon preoperative evaluation, you find the child in total discomfort. He is in the ED, lying on a hospital stretcher. The child reveals that the headache is 7/10 in severity when lying flat (similar to his baseline headache) and 10/10 on rising up. It is mainly frontal and extends on 'top of his head'. He also states that on sitting upright, the headache is unbearable. He also complains of nausea, an episode of vomiting and exhaustion due to lack of sleep. He has been taking clear fluids all day until 4 hours ago.

Case progression (preanesthesia physical examination)

He is awake and orientated in time, place and person. Pupils are bilateral equal and reactive to light. There are no focal neurological deficits. Rest of the exam is normal.

Case progression (anesthesia management):

Sedation or general anesthesia is now contemplated for administration of blood patch as the child is extremely anxious.

Questions:

What is your plan for the sedation or anaesthetic management of this case? What different strategies may be used to administer sedation in this case?

Case progression (procedure)

Due to the patient's inability to tolerate this procedure under local anesthesia alone, a decision is made to perform the epidural blood patch under GA. Intravenous anesthetic induction is performed with propofol (150 mg), and a laryngeal mask airway size 3 is inserted. General anesthesia is maintained with sevoflurane. The patient is positioned in left lateral decubitus and a 17g Tuohy needle is inserted at the level of the L4-L5 interspace using sterile aseptic technique. Another provider, using sterile aseptic technique, aspirates 9-10 ml of blood, from a venepuncture of the dorsum of the left hand with a 20g catheter. A total of 9 ml of blood is placed into the epidural space until slight resistance was felt.

Questions:

How much blood would you inject in the epidural space in a child? Why is this problem as compared to performing this procedure in an adult?

Case progression (post-procedure):

Upon waking up in the recovery unit, the patient's headache resolves completely. His parents are very grateful to the anesthesia team for performing the epidural blood patch.

Questions:

What are the complications of an epidural blood patch that you need to watch for? If the epidural blood patch fails, should a second blood patch be considered? What is the success rate of a second blood patch?

**Discussion:**

Idiopathic Intracranial Hypertension (IIH):

IIH is a condition consisting of increased intracranial pressure (ICP) of unknown etiology. Although it affects mainly obese women of child bearing age group, it may also affect children. It was also previously known as pseudotumor cerebri. The incidence is 0.9/100000 in the general population. These patients usually present with severe throbbing headache with lack of focal neurological deficits and failure to find a specific cause such as an intracranial lesion. Diagnosis of this condition is based on modified Dandy criteria: clinical features of raised ICP without focal neurological deficits (other than visual defects and 6<sup>th</sup> nerve palsy), normal CT or MRI imaging, and CSF pressure > 25 cm H<sub>2</sub>O. The pathogenesis of this condition is not clear – possible mechanisms may include increased CSF production, decreased absorptions, and aberrations in cerebral blood flow, cerebral edema and jugular venous insufficiency. Treatment may include serial lumbar punctures, corticosteroids, acetazolamide, lumboperitoneal shunt or optic nerve fenestration.

This is a high risk group for postdural puncture headaches as they need serial lumbar punctures for diagnosis and treatment and these LP procedures are performed by non-anesthesiologists usually with a larger bore cutting needle.

Post dural puncture headache:

Post dural puncture headache (PDPH) is a known complication of a lumbar puncture. The mechanism of this headache is related to the lowering of the CSF pressure. The low pressure causes traction on the intracranial structures in the upright position and these are pain sensitive, hence the headache. Another theory is that the loss of CSF volume and compensatory increase of blood volume causes cerebral venodilatation (Monroe-Kellie doctrine), hence the headache. The needle size and design of the needle tip may be significant risk factors for development of a PDPH. It is reported that in pediatric patients, the incidence of PDPH varies between 1 – 4% when a 25-27G cutting needle is used and 15% with a 22 G cutting needle (vs 9% with a 22 G pencil point needle). The treatment of a PDPH in children is usually conservative but sometimes an autologous epidural blood patch may be necessary to ameliorate PDPH. . Conservative management includes: psychological management of the child and parents, simple bed rest and use of drugs such as DDAVP, ACTH (1.5mcg/kg as an infusion), NSAIDs, sumatriptan, caffeine (by producing cerebral vasoconstriction) and abdominal binders. If conservative management fails, then an epidural blood patch is contemplated. The theory behind using an epidural blood patch is that the blood, when introduced in the epidural space the blood will clot and occlude the perforation preventing further leakage of the CSF. As evidenced by MRI, the blood spreads mostly in a cephalic direction, and therefore the blood patch should be performed at an intervertebral level

below the original dural puncture. Other measures described are epidural saline, dextran and use of intrathecal catheter. The usual dose or volume of blood that may be injected in children is 0.2-0.3ml/kg. Complications of an epidural blood patch include: transitory back pain, radicular pain, exacerbation of symptoms, and possibility of a subsequent failed epidural block.

#### IIH and PDPH:

PDPH is relatively uncommon in a patient with IIH. Actually, it seems paradoxical because IIH is a high pressure headache and PDPH is a low pressure headache. In this patient however, there was a functioning lumboperitoneal shunt (Codman set at 150 mm H<sub>2</sub>O) that was draining the excess CSF. There has been a report in literature of a patient who actually had intracranial hypotension and headaches that was caused by leakage of CSF from the thecal sac after lumboperitoneal shunt placement. In that case, the leak was treated with an epidural blood patch. The management of a patient with IIH and PDPH can indeed be very challenging.

#### **References:**

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