

Headache: Differential diagnosis and Evaluation

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PGY-1

Pediatrics

You are evaluating a 9 year old male patient at the ED brought by his mother, who says that her son has had a fever, cough, and rhinorrhea since 5 days ago, and is complaining of intermittent headaches since yesterday. He was treated with Tylenol at home but symptoms did not improve. Upon examination you observe an ill-appearing, poorly cooperative child, crying because his “head hurts”.

Vitals: Wt 40kg Temp: 39.5° RR: 30 HR: 125 BP: 112/75

At the ED he receives ibuprofen, and after 30 minutes the child appears more comfortable and cooperative, but still complaining of a headache. Physical exam showed no neck stiffness, with no focal neurological findings, hallucinations or behavior changes. Tympanic membranes appear erythematous bilaterally. Rest of physical exam was unremarkable

Repeat Vitals: Temp: 38.5°C RR: 26 HR: 110 BP 101/69

- What is the next best step when evaluating this patient?
 - a. LP
 - b. CT scan
 - c. Amoxicillin 45mg/kg/dose for 10 days
 - d. MRI
 - e. Reassurance

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- Among children evaluated in the ED for headache, infection is the most common cause.
- Children with fever (related almost entirely to infection) frequently complain of headache. Headaches associated with fever are thought to be due to vasodilation
- Children with normal CSF studies and those with **headache and fever, without meningeal signs** (who typically do not require CSF evaluation) likely have infectious causes for headache, such as viral syndrome, sinusitis, or dental abscess.
- A child with headache, a normal neurologic examination, **and no fever**, who has no other abnormal features identified on history or physical examination, may be experiencing a first migraine or a tension-type headache.
- The majority of children with headache and normal neurologic examinations who are evaluated emergently do not require ancillary studies.*

You are evaluating a 5 year old male patient at the ED, who has had 3 episodes of vomiting per day for the past week. He has been having headaches since 5 months ago. The headache is so severe that he wakes up from sleeping crying due to the pain. Mother took him to his PCP yesterday which prescribed Advil and oral hydration, but symptoms did not improve. Upon examination you observe a cooperative child, but prefers keeping his eyes closed because he is dizzy and nauseous.

Vitals: Wt 25kg Temp: 37.8° RR: 32 HR: 145 BP: 110/72

Physical exam showed no neck stiffness, but you observe bilateral papilledema, and abducens nerve palsy on the right side. Rest of physical exam was unremarkable.

At the ED he receives ibuprofen for the pain, and is found to be dehydrated, receiving a normal saline bolus at 20ml/kg.

Vitals: Temp: 37.2°C RR: 26 HR: 110 BP 105/75

- What is the next best step when evaluating this patient at the ED?
 - a. LP
 - b. CT scan
 - c. MRI
 - d. Admission for evaluation
 - e. Schedule outpatient imaging

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- A headache that **awakens** a child from sleep should raise suspicion about a possible brain tumor. Tension-type headaches typically develop late in the day and rarely cause a patient to awaken from sleep.
- Chronic progressive headache (increasing in frequency and severity over time) is a **common presenting symptom** among children with brain tumors.
 - However, very few children evaluated in the emergency department (ED) for headache have brain tumors as the cause.
 - In a large multicenter pediatric series describing children with brain tumors, 62 percent of patients had headaches at the time of diagnosis.
 - In comparison, in a small prospective series, less than 3 percent of children presenting to the ED with headaches had newly diagnosed brain tumors

- The early symptoms of brain tumors are often nonspecific and diagnosis may be delayed
 - Over 99 percent of children in the multicenter report and all of the children in the ED series had at least one other symptom or sign (ie, nausea/vomiting, visual disturbance, ataxia, or abnormal eye movements)

- Most patients with focal neurologic examinations should have a **CT performed before lumbar puncture**. There is a risk of herniation syndrome when lumbar puncture is performed in patients with increased intracranial pressure.
- Computed tomography (CT) is readily available and generally identifies any condition that requires immediate treatment.
- Some children may require subsequent magnetic resonance imaging (MRI) to provide clearer definition of abnormalities noted on CT or to identify lesions that may not be seen on CT (ie, some infections, hemorrhagic processes, or cerebral venous thrombosis).
- Because CT can be performed quickly and safely, **imaging should never be delayed in order** to obtain an MRI for a child with a suspected space-occupying intracranial lesion.

References

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- [Lewis DW, Qureshi F. Acute headache in children and adolescents presenting to the emergency department. Headache 2000; 40:200.](#)
- [Kan L, Nagelberg J, Maytal J. Headaches in a pediatric emergency department: etiology, imaging, and treatment. Headache 2000; 40:25.](#)
- UptoDate