Pediatric Headache

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Objectives

• Participants will be able to identify common causes of headaches in children.
• Participants will be able to treat common headaches in children.
• Participants will be able to identify "red flags" in children with headaches.
Disclosures

- I have nothing to disclose
Case

- 8 year old male with no significant past medical history who has had a history of headaches for the past 3 months. He describes pulsating pain in the frontal regions bilaterally lasting for up to 3 hours, but usually 1-2 hours. He has associated nausea, intermittent vomiting, photophobia, phonophobia, and visual scotomata.
- Physical exam shows normal spine, skin, heart, lung, and abdomen exam.
- Neurologic exam shows normal mental status, no papilledema, normal cranial nerve exam without any sign of limited abduction of the eyes, normal motor, sensory, coordination, reflexes, and gait exam
Epidemiology

• 37-51% of children have had a significant headache by age 7 and 57-82 % by age 15
• High genetic predisposition, possibly related to a P/Q calcium channel, adenosine triphosphatase sodium/potassium pump, or a voltage gated sodium channel gene
• Causes significant disability to both the child and to the parents
Migraine Diagnosis

- At least 5 attacks meeting following criteria
  - Headaches lasting 1-72 hours (sleep is included in duration) not attributable to another disorder
- 2 of the following
  - Unilateral location
  - Pulsating quality
  - Moderate or severe pain intensity
  - Aggravation by routine physical activity (walking or climbing stairs)
- 1 of the following
  - Nausea and/or vomiting
  - Photophobia and phonophobia (may be inferred by behavior)
- Aura may include:
  - Fully reversible visual symptoms including positive or negative features
  - Fully reversible sensory symptoms
  - Fully reversible dysphasic speech disturbance
  - (No motor weakness)
Tension Type Headaches

- Headache lasting 30 minutes to 7 days with at least 2 of the following
  - Pressure/tight (nonpulsating) quality
  - Mild or moderate intensity
  - Bilateral location
  - No aggravation by walking stairs or other routine activity
  - No nausea or vomiting
  - Photophobia and phonophobia are not present, or only one
Red Flags in History

- Thunderclap or worst headache of life
- Occipital headaches exclusively
- Headaches awakening from sleep
- Headaches worsening with bending over, cough, sneeze, or Valsalva maneuvers
- Headaches with a chronic progressive nature (relative)
- Progressive lethargy, personality change, or ataxia
- Systemic symptoms: fever, weight loss, rash, joint pain

Blume HK and Szperka CL. *Pediatric Annals* 2010; 39(7): 431-439
Red Flags on Physical Exam

- Papilledema
- Cranial nerve III, IV or VI abnormalities (i.e. abnormal pupillary changes or eye movements)
- Hemiparesis
- Ataxia
- Kernig’s or Brudzinski’s sign
- Cushing’s triad is a late finding
  - Hypertension
  - Bradycardia
  - Respiratory depression

Blume HK and Szperka CL. *Pediatric Annals* 2010; 39(7): 431-439
Acute Treatment

- Initially most parents try an over the counter medication
  - Ibuprofen is superior to acetaminophen
  - Should be used at 7.5 - 10 mg/kg/dose
  - Naproxyn (Aleve) is also helpful in older children
  - No more than 2 doses per week
Acute Migraine Treatment

• Sumatriptan (Imitrex) – Adult 25-100 mg, max 200 mg/day, nasal spray, subcutaneous injection, or tablet
  – 4-6 years – 25 mg tablet or 5 mg nasal spray
  – 7-11 years – 25-50 mg tablet or 10 mg nasal spray
  – >12 years – 50-100 mg tablet or 20 mg nasal spray
• Naproxen – 5-7 mg/kg/dose q8-12 hours prn
• Rizatriptan (Maxalt) – Adult 5-10 mg, may repeat in 2 hours, ODT or tablet, approved 6-17 years
• Zolmitriptan (Zomig) – Adult 2.5-5 mg, may repeat in 2 hours, ODT, nasal spray, or tablet
• Almotriptan (Axert) – 6.25-12.5 mg, may repeat in 2 hours, approved 12 years and up

Blume HK. *Pediatrics in Review.* 2012:33;562-575
Contraindications to Triptans or Ergot Alkaloids (DHE)

• Ischemic heart disease, coronary vasospasm or other significant cardiovascular disease
• Uncontrolled hypertension
• Hemiplegic or basilar migraine
• Use of another triptan or ergot within 24 hours
• Use of a monoamine oxidase inhibitor within 2 weeks

Table 9. \textbf{Selected Preventive Medications for Pediatric Migraine}

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyproheptadine</td>
<td>0.25–1.5 mg/kg per day Adult: 4 20 mg/d tid</td>
<td>Sedation, dry mouth</td>
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<tr>
<td></td>
<td></td>
<td>Weight gain</td>
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<tr>
<td>Tricyclic antidepressants</td>
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<tr>
<td>Amitriptyline</td>
<td>10–50 mg qhs</td>
<td>Sedation</td>
</tr>
<tr>
<td></td>
<td>0.1–1 mg/kg per day</td>
<td>Weight gain</td>
</tr>
<tr>
<td></td>
<td>Maximum: 50–100 mg for headache</td>
<td>May exacerbate cardiac conduction defects (consider baseline electrocardiogram)</td>
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<tr>
<td></td>
<td>10–75 mg qhs</td>
<td>Suicidal thinking, mood changes</td>
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<tr>
<td>Nortriptyline</td>
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<tr>
<td>Antiepileptics</td>
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<tr>
<td>Topiramate</td>
<td>1–2 mg/kg per day for headache</td>
<td>Sedation, paresthesias, appetite suppression/weight loss, glaucoma, kidney stones</td>
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<tr>
<td></td>
<td>Typical adult dose:</td>
<td>cognitive changes, word finding difficulty, mood changes, depression</td>
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<tr>
<td></td>
<td>50 mg bid</td>
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<td></td>
<td>Maximum: 800 mg bid for seizures</td>
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<tr>
<td>Valproic acid</td>
<td>20–40 mg/kg per day; adult: 500–1,000 mg/d</td>
<td>Weight gain, bruising, hair loss, hepatotoxicity, ovarian cysts, teratogenic, thrombocytopenia, leukopenia, mood changes, depression</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>10–40 mg/kg per day</td>
<td>Fatigue, ataxia, tinnitus, gastrointestinal complaints, mood changes, depression</td>
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<tr>
<td></td>
<td>Adult: 1,800–2,400 mg/d Maximum: 3,600 mg/d</td>
<td></td>
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<tr>
<td>Antihypertensives</td>
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<tr>
<td>Propranolol(^a)</td>
<td>2–4 mg/kg per day Adult: 160–240 mg/d</td>
<td>Hypotension</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sleep disorder, Decreased stamina Depression</td>
</tr>
<tr>
<td>Verapamil</td>
<td>4–10 mg/kg per day divided tid</td>
<td>Hypotension, nausea, atrioventricular block</td>
</tr>
<tr>
<td></td>
<td>13–18 y: 240 mg</td>
<td>Weight gain</td>
</tr>
</tbody>
</table>

\(^a\) Propranolol is not recommended for use in children with migraine.
Case

- 14 year old previously healthy boy struck another player with helmet to helmet contact, then fell to the ground and lost consciousness for ~30 seconds
- Trainer noted that he had difficulty with orientation to time, finger to nose, and complained of headache
- He was taken to his primary care doctor for evaluation where he continued to have headache, but no abnormalities on physical exam
• 13 year old girl had a head to head injury while going up for a “header” in soccer
• She initially kept playing but seemed confused and didn’t stay in her position. She immediately complained of dizziness, but had no vomiting or loss of consciousness
• You are seeing her 2 weeks later and she is complaining of a daily tension type headache, confusion with school work and dizziness.
Concussion

- 10% to 45% of children with mild traumatic brain injury or concussion have postconcussive symptoms lasting at least 3 months
- 2% have symptoms a year or more after injury
- Girls sustain more concussions than boys playing similar sports in both high school and college

Choe MC and Blume HK. Journal of Child Neurology. 2015; Feb 10
Concussion

- Postconcussion syndrome is a constellation of physical, emotional, and cognitive symptoms following mild traumatic brain injury that includes
  - Photophobia
  - Phonophobia
  - Dizziness
  - Balance deficits
  - Behavioral changes
  - Mood disturbances
  - Sleep problems
  - Memory, attention, and concentration deficits

Choe MC and Blume HK. *Journal of Child Neurology*. 2015; Feb 10
Posttraumatic Headache

• Acetaminophen is preferred for the first 24 hours after injury to avoid bleeding risk with nonsteroidal medications
• Cognitive and physical rest should be initiated with a gradual return to exercise and school
• Opiates should be avoided to prevent medication overuse
• Psychotherapy
• Physical therapy
• Biofeedback
• Nerve blocks
• Steroid injections

Choe MC and Blume HK. *Journal of Child Neurology*. 2015; Feb 10
Cocoon

- Start *immediately* after concussion to maximize time to recovery
- Should not attend school until headache and symptom free
- Sleep in a darkened room as much as possible for the first 24-48 hours
- No reading, video games, iPod, computer or text messaging
- Do not attend team practice or games, run, or lift weights
- No movies, concerts, amusement rides
- No driving or operating motorcycles, ATV’s, etc.
- Do not participate in other sports or activities that could exacerbate symptoms
- Avoid or stop any activities immediately that cause headaches or worsen concussion symptoms
Cocoon

• Over the counter melatonin may be used for sleep after the first week

• Cognitive Exercise Protocol
  – Allows the student to read/use the computer in gradually increasing increments for the first 24 hours before returning to school
  – Begin reading a few pages, take a break, then double the amount of reading every 10-15 minutes
  – Alternate reading with using the computer initially for 10 minutes, then progressively adding 10 minutes
  – If the student tolerates cognitive exercise then they may return to school with modifications if needed
13 year old female presents with a history of daily headaches worse when she lies down, with occasional loss of vision. She complains of frequent tinnitus.

Physical exam show blurred vessels on the medial side of the optic disc and limitation of eye movements laterally in both eyes.

General exam is notable for a weight > 98%
Papilledema
Diagnostic Workup for Idiopathic Intracranial Hypertension

- Neuroimaging
  - MRI
  - MRV

- Ophthalmology exam with formal visual field testing and close follow up

- Lumbar puncture with opening pressure noted with the patient lying down and legs extended and relaxed
  - Positive findings if > 28 cm H$_2$O (25 cm if not obese or sedated)
  - If elevated pressure, should take off enough CSF to have a closing pressure of < 20 cm H$_2$O

Treatment for Idiopathic Intracranial Hypertension

• Treatment
  – Acetazolamide
  – Furosemide
  – Steroids

• Surgery
  – Optic nerve sheath fenestration
  – Lumboperitoneal shunting
• 4 year old male with a history new onset headaches awakening him from sleep in the early morning hours and improving after vomiting.

• Physical exam shows truncal ataxia, but otherwise normal.
Case

• 13 year old male with a history of pain in the occipital region and neck with intermittent “falling asleep” of his arms.

• Physical exam shows a cape-like distribution decreased sensation to pinprick and temperature, but otherwise is normal
Chiari Malformation

- Greater than 5 mm of cerebellar tonsilar herniation through the foramen magnum
- Measured on a midline sagittal image MRI
- Helpful to measure CSF flow through the foramen magnum
- May also cause compression on the brainstem
- Syringomyelia may cause primarily sensory findings in the distribution of the cervical cord
- Treated with suboccipital decompression
- Some patients have migraine pathology and Chiari
- Up to 30% of patients with Chiari are asymptomatic

Blume HK. *Pediatrics in Review.* 2012:33;562-575
Case

• 17 year old male with a history of drug abuse presents to the emergency department with obtundation and meningismus

• Physical exam shows a GCS of 8 (Eye 2, Verbal 2, Motor 4) with a positive Kernig sign
Conclusions

- Children have a significant frequency of headaches that require treatment
- There are a limited number of concerning signs and symptoms from secondary causes
- Concussion has some transforming recommendations which are being currently updated
- Neurologic consultation is available with expedited review if indicated by contacting (864) 454-5110