Headaches

Daniel A. Hirsh, MD
Pediatric Emergency Medicine Associates, LLC
Medical Director, Children’s Healthcare of Atlanta Nurse Advice Line
Children’s Healthcare of Atlanta, Scottish Rite and Egleston
WellStar Hospital Systems
Disclosure

I have no actual or potential conflict of interest in relation to this presentation.
Disclosure

However, I do work in a busy pediatric ED, mostly at night and by the end of a long shift, without eating, I often have headaches.
Disclosure

I will mention treatments that are not FDA approved for pediatrics, however, are used frequently to treat headaches.
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Objectives

- Epidemiology
- Classification of common headaches
- Headache Patterns
- Specific Headaches
- Management and Treatment Strategies
- When to Refer
- Summary
Epidemiology
Epidemiology

• Affects up to ~90% of pediatric patients
• A common cause of missed school and extracurricular activity
• Prepubescent Boys > Girls
• Puberty Girls > Boys
• Chronic headache 1-4% of adolescents, subsequent increased risk of suicide
Top 10 Chief Complaints at Children’s EDs

1. Fever
2. Vomiting
3. Cough
4. Abdominal Pain
5. Breathing Problem
6. Diarrhea
7. Rash
8. Congestion
9. Headache
10. Ear Complaint
Final Diagnosis of the Chief Complaints, All

1. Headache
2. Viral Infection
3. Pharyngitis/Strep
4. Head injury
5. Migraine
6. Vomiting
7. Dehydration
8. Influenza
9. Constipation
10. Tension Type Headache
Final Diagnosis of the Chief Complaints, Admitted
Migraine admissions
PART I

The Primary Headaches

The International Classification of Headache Disorders 3rd edition (Beta version)
Classification

• Primary
  – Tension Type
  – Migraines
  – Chronic Daily Headache

• Secondary
  – Increased ICP, IIH
  – Infection/inflammation/Viral Syndrome
  – Medication overuse headache
  – Trauma
  – Tumor
  – VP Shunt Malfunction
  – Chronic Disease: Cancer, Sickle Cell
Headache Patterns

• Episodic/Acute Recurrent
• Chronic Progressive
• Chronic Nonprogressive
• Acute
• New Daily Persistent
Figure. Headache patterns. (Adapted with permission from Rothner AD. The evaluation of headaches in children and adolescents. *Semin Pediatr Neurol.* 1995;2[2]:109–118.)
<table>
<thead>
<tr>
<th>Acute headache</th>
<th>Chronic progressive headaches</th>
<th>Chronic nonprogressive headaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migraine</td>
<td>Elevated intracranial pressure</td>
<td>Chronic tension-type headaches</td>
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<td>Viral respiratory infection, streptococcal pharyngitis</td>
<td>Tumor</td>
<td>Chronic or transformed migraine</td>
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<td>Meningitis/encephalitis</td>
<td>Vascular malformations</td>
<td>New daily persistent headache</td>
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<tr>
<td>Intracranial hemorrhage</td>
<td>Infection</td>
<td>Chronic sinus disease</td>
</tr>
<tr>
<td>Tumor</td>
<td>Sinus venous thrombosis</td>
<td>Dental disease</td>
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<tr>
<td>Toxic exposures: alcohol, toxins, illicit drugs, medications</td>
<td>Idiopathic intracranial hypertension</td>
<td>Sleep apnea</td>
</tr>
<tr>
<td>Trauma</td>
<td>Endocrine disease: thyroid or parathyroid disease</td>
<td>Idiopathic intracranial hypertension</td>
</tr>
<tr>
<td>Stroke</td>
<td>Chiari malformation</td>
<td>Thyroid disease</td>
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<td>Malignant hypertension</td>
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<td>Fasting/eating disorders</td>
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<td>Episodic recurrent headaches</td>
<td>Chronic posttraumatic headache</td>
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<td>Tension-type headache</td>
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<td>Chronic trigeminal autonomic cephalalgias</td>
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<tr>
<td>Migraine with or without aura</td>
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<td>Seizure-associated headache</td>
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<td>Mitochondrial disease</td>
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<td>Trigeminal autonomic cephalalgias</td>
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Specific Headaches
Case 1

• 13 year old with intermittent headaches presents at well child check

• Located: bilaterally
• Feels like: pressing on the side of her head
• Duration: short as 30 minutes or long as a day
• Effect on activity: she can still participate in all her activities
• Other symptoms: no nausea, does have photophobia
• Physical Exam: normal neurologic exam
Infrequent Tension Type Headache

A. At least 10 episodes of headache occurring on <1 day per month on average (<12 days per year) and fulfilling criteria B-D

B. Lasting from 30 minutes to 7 days

C. At least two of the following 4 characteristics
   A. Bilateral location
   B. Pressing or tightening (non pulsating) quality
   C. Mild or moderate intensity
   D. Not aggravated by routine physical activity such as walking or climbing stairs

D. Both of the following
   A. No nausea or vomiting
   B. No more than one of photophobia or phonophobia
Case 2

- 15 yo presents to the Emergency Department
- Located: bilaterally
- Feels like: throbbing
- Duration: for the past 4 hours
- Effect on activity: worse with activity
- Other symptoms: + nausea, + photophobia
- Physical Exam: appears uncomfortable, normal neurologic exam
Migraine Headaches

- A leading cause of medical visit
- Diagnosis made with history and physical exam without neuroimaging
- Age 3-7yrs 1-3%
- Adolescence 8-23%
- In young children, symptoms of vomiting or vertigo more prominent than headache
- Frontal, temporal, unilateral or bilateral, pounding and pulsing
- Exclusive occipital pain concerning in intracranial process*
Migraine Headaches

- Strong genetic component
- Exact mechanisms unknown
- Shorter duration relative to adults
- Often appear ill from phono/photophobia
- Sleep often relieves the headache
- Triggers include: stress, illness, fasting, poor sleep, dehydration
Migraine without Aura

A. At least five attacks fulfilling criteria B-D

B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)
   In children can last 2-72 hours

C. Headache has at least two of the following four characteristics
   A. Unilateral location (can be bilateral in children and adolescents)
   B. Pulsating quality
   C. Moderate or severe pain intensity
   D. Aggravation by or causing avoidance of routine physical activity

D. During headache at least one of the following:
   A. Nausea and/or vomiting
   B. Photophobia and phonophobia (in children infer from behavior)
Migraine with Aura

A. At least two attacks fulfilling criteria B and C

B. One or more of the following fully reversible aura symptoms (occur <30 minutes before the headache)
   - Visual
   - Sensory
   - Speech and/or language
   - Motor
   - Brainstem
   - Retinal

C. At least two of the following four characteristics

A. At least one aura symptom spreads gradually over > 5 minutes and/or two or more symptoms occur in succession

B. Each individual aura symptom lasts 5-60 minutes

C. At least one aura symptom is unilateral

D. The aura is accompanied or followed within 60 minutes by headache
Case 2 continued

• Same patient presents 4 months later. She states her migraines are now occurring about 20 times per month and each headache is lasting about 4 hours
Chronic Migraine

A. Headache (tension type and/or migraine like) on $\geq 15$ days per month for $>3$ months and fulfilling criteria B and C

B. Occurring in a patient who has had at least 5 attacks fulfilling criteria B-D for migraine without aura and/or criteria B and C for migraine with aura

C. On $\geq 8$ days per month for $>3$ months, fulfilling any of the following
   a. Criteria C and D for migraine without aura
   b. Criteria B and C for migraine with aura
   c. Believed by the patient to be migraine at onset and relieved by a triptan or ergot derivative
Chronic Daily Headache

• ≥15 headache days per month
  1. Chronic Migraines
  2. Chronic Tension Type
  3. New Daily Persistent Type
• Over time, severe migraine symptoms diminish, though may have spikes
Chronic Daily Headache

- Difficult to distinguish types (migraine versus tension type)
- Preventative treatment for >4 days per month of disabling headache per month
- Lifestyle issues must be addressed: sleep, stress, food, caffeine, exercise, hydration
- Evaluation for depression and anxiety essential
Elevated Intracranial Pressure

- Headache is the most common symptoms of elevated ICP
- Progressive
- Nighttime wakening
- Worse with Valsalva or exertion
- Persistent vomiting, neurologic deficits, lethargy, personality change
Idiopathic Intracranial Hypertension Headache

• AKA: Pseudotumor cerebri
• Daily headaches, +/- migraine features
• Vision disturbance, tinnitus, diplopia
• Preadolescents: there is no difference among females and males, obesity not associated, at risk for underlying cause
• Adolescents: females > males, obesity associated
Idiopathic Intracranial Hypertension Headache

A. Any headache fulfilling criterion C
B. Idiopathic intracranial hypertension (IIH) has been diagnosed, with CSF pressure >250 mm CSF (measured by lumbar puncture performed in the lateral decubitus position, without sedative medications or by epidural or intraventricular monitoring)
C. Evidence of causation demonstrated by at least two of the following:
   a. headache has developed in temporal relation to IIH, or led to its discovery
   b. headache is relieved by reducing intracranial hypertension
   c. headache is aggravated in temporal relation to increase in intracranial pressure
D. Not better accounted for by another ICHD-3 diagnosis
Infection

• Acute viral illness with fever is the most common cause
• EBV can cause New Daily Persistent Headaches
• Sinus infection may cause headaches
• Chronic sinus disease does not, although many will have underlying primary headaches
• Meningitis/Encephalitis
Trauma

• While intracranial hemorrhage is feared with head injury, the majority have no significant structural injury

• PECARN rules for detecting Clinically Important Traumatic Brain Injury
Poisonings

• CO Poisoning
  – Others in same location with similar symptoms
  – Be aware that children may be affected first
### Medications Associated With Headaches

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<tbody>
<tr>
<td>Angiotensin-converting enzyme inhibitors</td>
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<tr>
<td>α- and β-adrenergic agonists and blockers</td>
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<tr>
<td>Amphetamines</td>
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<td>Antiarrhythmics</td>
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<td>Calcium channel blockers</td>
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<td>Nitrates</td>
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<td>Sympathomimetics</td>
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<td>Caffeine</td>
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<td>Opioids</td>
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<td>Acid blockers: including famotidine and ranitidine</td>
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<tr>
<td>Antimicrobials: amoxicillin, metronidazole, sulfamethoxazole, trimethoprim, ciprofloxacin, gentamicin, nitrofurantoin, ofloxacin, tetracyclines</td>
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<tr>
<td>Immunoglobulin</td>
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<td>Amiodarone</td>
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<tr>
<td>Thyroid hormone replacement</td>
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<td>Vitamin A and retinoic acid</td>
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Case 4

• 14 year old with migraines. She is having daily headaches. These are not her migraine headaches. For the past month she has take ibuprofen 200mg in the morning daily
• Located: bilateral
• Feels like: throbbing
• Duration: every day
• Effect on activity: No effect
• Other symptoms: None
• Physical Exam: normal neurologic exam
Medication Overuse Headache

• Headache occurring on \( \geq 15 \) days per month in a patient with a pre-existing headache disorder

• Regular overuse for \( >3 \) months of one or more drugs that can be taken for acute and/or symptomatic treatment of headache
Medication Overuse Headache

• Aceteminophen/Butalbital (ex: Fioricet)
• Opiates
• Caffeine
• NSAIDs (misuse when >15 days/month)
• Triptans (misuse when >10 days/month)
• Low daily use of medication worse than high dose
Management
History... ask the patient

- Medical ... past history and medication use may be key
- Social ... home environment, problems with friends or at school
- Sleep ... poor sleep hygiene or lack of sleep may represent depression
- Diet
- Exercise
- Caffeine ... overuse may cause withdrawal
Helpful Headache Questions
## TABLE 1. Helpful headache questions (Reprinted with permission from Dooley JM²)

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<td>4. What is the headache frequency?</td>
<td>Migraines typically occur weekly or less often. TTH occur daily or several times per week. Headache syndromes in childhood, such as cluster headache, may have their own unique pattern, occurring in clusters of two to three per week over a few weeks or months, followed by long periods of headache freedom. Headaches due to increased intracranial pressure (ICP) often occur nightly.</td>
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6. Do the headaches happen at any particular time or circumstance? Headaches that occur at night or in the early morning are more likely to reflect increased ICP, although as many as 25% of migraine episodes occur at night. Children with TTH may describe waking with their headache, although this is typically after the child arises in contrast with increased ICP, which may wake up the child. Occasionally, headaches occur exclusively in one situation or circumstance (e.g., school, when hungry or with changes in weather). Children with chronic morning headaches and a history of bruxism should be examined for temporomandibular joint dysfunction.

7. Is there an aura or prodrome? Children with migraines may be able to describe or draw their aura. If the aura is persistently on the same side, a structural lesion should be excluded. Parents may predict a migraine hours before it occurs because their child may show a prodrome of lethargy, mood change, thirst or food cravings, yawning, or pallor.

8. Where is the pain? Migraine is bifrontal in more than 55%. TTH is usually more diffusely located. The severity of pain is not helpful in identifying serious causes of headaches. An inability to describe the quality of the headache is much more likely to distinguish those with brain tumors or ventriculoperitoneal shunt malfunctions; occipital headaches are more likely to occur in children with brain tumors. Persistent unilateral headaches should be considered to be suspicious.

9. What is the pain like? Offering choices helps to determine the quality of the pain. Migraines are typically throbbing, but may be described as heavy or pressing. An inability to describe the pain is more significant than the actual choice of adjective. Historical concepts of throbbing equating to migraine and band-like to TTH are probably inaccurate.

10. Are there associated symptoms? Migraines are usually accompanied by nausea, vomiting, anorexia, photophobia, phonophobia, or osmophobia. Vomiting without accompanying nausea is suspicious. Migraine with aura may be associated with aphasia, vertigo, visual, sensory, or other associated symptoms. If symptoms persist beyond the headache or if the associated phenomenon is persistent from one headache to the next, thought should be given to possible underlying pathology.

11. What do you do during the headache? What a child does if a headache begins during play is often more informative than asking what they do if a headache begins at school. Those with migraines will usually interrupt their activity to return home. Children with TTH will often watch television or play video games. In comparison, those with migraines usually seek refuge in a quiet and darkened bedroom.
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12. Would I know you had a headache if I saw you?

The child with migraines usually looks ill. Those with TTH usually appear normal.

13. What makes the headache better and worse?

Details on medication use can provide insight into both the headache and the patient/family’s preferences for headache management. Many report using large doses of medication despite its lack of benefit. Migraineurs often describe benefit from sleep or simple analgesics taken early in the headache course. Aggravating factors in migraine include activity, light, noise, and smells. Those with increased ICP will often find increased discomfort on lying down. Headaches due to low ICP are usually worse on sitting or standing up.

14. Are there symptoms between headaches?

Patients with migraines or TTH are asymptomatic between headaches. Ongoing symptoms, such as forgetfulness, confusion, or localizing neurological symptoms suggest a structural lesion. Brain tumors may manifest as lethargy, personality changes, or recent school failure. Difficulties with concentration may persist beyond the headaches in those who have suffered a concussion.

In the setting of chronic daily headache, comorbid symptoms of depression may be present. Underlying psychosocial factors are common and may relate to learning difficulties, bullying, parental conflict, grieving reactions, and drug or alcohol abuse. In a population-based study, school-related factors, lifestyle, and mental health were predictive of headaches in adolescence.

15. Are there any other health problems?

Children with chronic illnesses often feel stressed by their prognosis, they need to attend hospital visits and take medications. Those with hypertension may have “migraine-like” headaches.
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<td>17. Is there a family history of headaches?</td>
<td>Many children with migraine or TTH have first-degree family members with similar headaches. In these families, educational efforts should be directed toward all those in the family with headaches.</td>
</tr>
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<td>18. What do you think is causing the headaches?</td>
<td>This is usually a very valuable question. Some children will identify a particular stressor of which the parents are often unaware. Both children and parents are also afforded the opportunity to discuss their fears of underlying pathology. A number of families will demonstrate a remarkable misunderstanding of the potential causes of their child’s headaches. Many believe the headaches are caused by chronic sinusitis. There is no evidence to support chronic headaches as a result of chronic sinusitis.</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>16. Are you taking medications?</td>
<td>Headaches may occur as an adverse effect to medications used to treat other conditions or to treat the headaches themselves. It is important to understand the attitudes of the patient and parents toward medication. Quantifying the child's use of non-prescription analgesics will identify those at risk for rebound analgesic headaches. A medication history may also reveal exposure to medications associated with idiopathic intracranial hypertension, such as oral contraceptives, vitamin A, isotretinoin, tetracycline, and corticosteroids.</td>
</tr>
<tr>
<td>17. Is there a family history of headaches?</td>
<td>Many children with migraine or TTH have first-degree family members with similar headaches. In these families, educational efforts should be directed toward all those in the family with headaches.</td>
</tr>
<tr>
<td>18. What do you think is causing the headaches?</td>
<td>This is usually a very valuable question. Some children will identify a particular stressor of which the parents are often unaware. Both children and parents are also afforded the opportunity to discuss their fears of underlying pathology. A number of families will demonstrate a remarkable misunderstanding of the potential causes of their child's headaches. Many believe the headaches are caused by chronic sinusitis. There is no evidence to support chronic headaches as a result of chronic sinusitis.</td>
</tr>
</tbody>
</table>
Physical Exam

• Mental Status and Speech
• Vision
• Fundoscopic exam
• Cranial Nerves
• Motor and Strength
• Reflexes, sensation, coordination and gait
• Look for asymmetries
American Academy of Neurology Practice Guideline

• “The American Academy of Neurology/Child Neurology Society practice parameter (2002) states that neuroimaging is not indicated in a child with recurrent headache and a normal neurologic examination...”
American Academy of Neurology Practice Guideline

“...Nonetheless, 45% of children with nonacute recurrent headaches will receive at least one neuroimaging study without clinical benefit.”
Red Flags

• Progressive pattern of the headache: becoming more severe and/or more frequent

• Increased headache with straining, coughing, or sneezing

• Explosive or sudden onset of severe headache (<6 mo duration)

• Systemic symptoms: fever, weight loss, rash, and joint pain
Red Flags

• Secondary risk factors: immunosuppression, hypercoagulable state, neurocutaneous disorder, cancer, genetic disorder, and rheumatologic disorder
• Neurologic symptoms or signs: altered mental status, papilledema, abnormal eye movements, or other abnormalities or asymmetries on neurologic examination
• New or different severe headache, change in attack frequency, severity, or clinical features
• Sleep-related headache, headache waking the patient from sleep, or headache always present in the morning
**TABLE 3. Risk factors for consideration of imaging in children with headache (Reprinted with permission from Kabbouche MA[14])**

1. Abnormal neurological examination
2. Atypical presentation of the headache: vertigo, intractable vomiting, and headache waking the child from sleep
3. Recent headache of less than 6 months
4. Child of less than 6 years of age
5. No family history of migraine and/or primary headache
6. Occipital headache
7. Change in type of headache
8. Subacute progressive headache severity
9. New-onset headache in an immunosuppressed child
10. First and/or worst headache
11. Systemic symptoms and signs
12. Headache associated with confusion, mental status changes, or focal neurological complaints
“In multiple studies of children presenting at the emergency room with headache, all with serious intracranial pathology displayed red flags in their history or objective neurologic signs on examination, e.g., loss of consciousness, optic disc swelling, ataxia, hemiparesis, abnormal reflexes, or abnormal eye movements. In addition, in a study of more than 3000 children with brain tumors, of those who presented with headache, less than 1% reported headache as their only symptom, and 97.7% demonstrated at least one objective abnormality on neurologic examination.”
Imaging

• **CT**
  - Modality of choice for hemorrhage or fracture
  - Not indicated for non-emergency headaches with normal neurologic examination
  - Available 24/7
  - Cost and Risk

• **MRI**
  - Modality of choice
  - May require sedation
  - Outpatient study
  - Cost
Management

- Lifestyle Modification
- Preventative Treatment
- Acute Management
- Complementary Treatment
## Lifestyle Management

<table>
<thead>
<tr>
<th>Category</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sleep</strong></td>
<td>Regular/sufficient sleep. 8-10 hours each night with no more than 2 hours of variability in sleep or wake timing</td>
</tr>
<tr>
<td><strong>Meals</strong></td>
<td>Regular/sufficient meals and hydration. Eat 3 healthy meals per day. Goal in ounces per day = weight in pounds to a max of 100 oz per day (no caffeine)</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>Regular aerobic exercise. 3 days per week for 30 minutes at a time</td>
</tr>
<tr>
<td><strong>Relaxation</strong></td>
<td>Stress reduction</td>
</tr>
<tr>
<td><strong>Trigger Avoidance</strong></td>
<td>Avoid triggers</td>
</tr>
</tbody>
</table>
Acute Management

• Early intervention - at the ONSET of headache - is most effective

• Most can be treated successfully with over-the-counter medication

  Ibuprofen 10mg/kg/dose
  Naproxen 10mg/kg/dose

• Caffeine in the form of tea/soda can be added if needed

• Drink with plenty of fluids
Acute Management

• Triptans
<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rizatriptan</td>
<td>Adult: 5–10 mg may repeat once in 2 h ODT or tablets</td>
</tr>
<tr>
<td></td>
<td>Maximum: 15 mg/d</td>
</tr>
<tr>
<td>Zolmitriptan</td>
<td>Oral (tablet or ODT) or nasal</td>
</tr>
<tr>
<td></td>
<td>Adult 2.5–5 mg per dose; may repeat once in 2 h</td>
</tr>
<tr>
<td></td>
<td>Maximum: 10 mg/d</td>
</tr>
<tr>
<td>Sumatriptan</td>
<td>Oral: 25–100 mg, maximum 200 mg/d</td>
</tr>
<tr>
<td></td>
<td>Nasal:</td>
</tr>
<tr>
<td></td>
<td>• 4–6 y: 5 mg</td>
</tr>
<tr>
<td></td>
<td>• 7–11 y: 10 mg</td>
</tr>
<tr>
<td></td>
<td>• &gt;12 y: 20 mg</td>
</tr>
<tr>
<td></td>
<td>• Adult maximum: 40 mg/d</td>
</tr>
<tr>
<td></td>
<td>SC: 0.06 mg/kg, &gt;12 y: 6 mg SC, Adult maximum: 12 mg/d SC</td>
</tr>
<tr>
<td>Almotriptan</td>
<td>6.25–12.5 mg; may repeat dose once in 2 h</td>
</tr>
<tr>
<td></td>
<td>Maximum: 25 mg/d</td>
</tr>
</tbody>
</table>
Acute Management

- Antiemetics Medications
- Ondansetron 0.2mg/kg, 2mg, 4mg, 8mg q8 hr
- Promethazine* 0.25 - 0.5 mg/kg/dose, adult 12.5 - 25 mg/dose
- Prochlorperazine* 2.5 - 5 mg BID PRN, adult 5 - 10 mg q 6-8 hours, max 40mg/day

*There is risk for dystonic reaction/sedation. Consider Diphenhydramine (ex: Benadryl) use
Complementary Treatment

• Biofeedback therapy
• Relaxation techniques
• Hypnosis
• Acupuncture
• Massage Therapy
Preventative Therapy

• Migraines >4 times per month
• Migraines that limit daily activities
  – Missing school, extracurricular activities
  – Adverse effect on grades, ability to pay attention
  – Disrupting sleep
  – Secondary psychiatric symptoms – depression
• Migraine with interfering neurologic signs
  – Visual loss
  – Weakness
  – Confusion
  – Vertigo
Preventative Therapy

• Amitriptyline
  – 1mg/kg/qhs – max 100mg/day
  Available in 10mg or 25mg tablets
  Side effects
  • BLACK BOX warning – increased risk of depression and suicidality in children or teenagers that are already suicidal or depressed
  • Dry mouth, dry eyes, lightheadedness, sleepiness, decreased seizure threshold, and caution in those taking thyroid medications
  • Avoid in patients with cardiac rhythm abnormalities or other cardiac issues such as hypertension
Preventative Therapy

• Topiramate
  – 2mg/kg/d divided BID – max 150 mg
  – Available in sprinkles and tablets
  – Side effects
    • Decreased appetite, cognitive effects, paresthesias, kidney stones, glaucoma, decreased sweating, may decrease birth control levels, may increase metformin levels
Trial of Amitriptyline, Topiramate, and Placebo for Pediatric Migraine

Scott W. Powers, Ph.D., Christopher S. Coffey, Ph.D., Leigh A. Chamberlin, R.D., M.Ed., Dixie J. Ecklund, R.N., M.S.N., Elizabeth A. Klingner, M.S., Jon W. Yankey, M.S., Leslie L. Korbee, B.S., Linda L. Porter, Ph.D., and Andrew D. Hershey, M.D., Ph.D., for the CHAMP Investigators*

CONCLUSIONS

There were no significant differences in reduction in headache frequency or headache-related disability in childhood and adolescent migraine with amitriptyline, topiramate, or placebo over a period of 24 weeks. The active drugs were associated with higher rates of adverse events. (Funded by the National Institutes of Health; CHAMP ClinicalTrials.gov number, NCT01581281).
Preventative Therapy

• Cyproheptadine
  – 0.25-1.5 mg/kg/d divided bid
  – Available in 2mg/5ml suspension and 4mg tablets
  – Side effects
    • Increased appetite and lethargy
Other Preventative

• Valproic Acid
  – May provide rapid relief
  – Use if underweight
  – Increased risk of teratogenicity; counsel if child-bearing age

• Propranolol
  – Use in POTS, hypertension
  – Avoid in patients with asthma and depression

• Cefaly
  – Provides neurostimulation to prevent attacks
  – Not FDA approved for children and no insurance reimbursement

• Botulinum Toxin
  – Must meet criteria for chronic migraine and failed two preventatives
When to Refer
When should I refer to a neurologist?

- Recurrent headache that has been present for at least 6 months and is not responding to first line treatment including acute abortive treatment and lifestyle modifications
- Headache that is resulting in missed school days or worsening school performance (including declining grades or decreased participation in extracurricular activities)
When should I refer to the ED?

• The patient has a new, severe headache of acute onset

• Headache with focal neurologic deficit or papilledema

• Migraine that is not responding to abortive therapy
ED Treatment

- Dim Lights
- Limit TV/Cell Phone
- Minimize Visitation
ED Treatment

- Ketorolac (ex: Toradol) 0.5mg/kg up to 30mg
- Prochlorperazine 0.1-0.15 mg/kg up to 10mg
- Diphenhydramine (ex: Benadryl) 1mg/kg up to 50mg
- IV Fluids
ED Treatment

• Second Line
  – Valproic Acid Load 15mg/kg up to 1000mg

• Third line
  – Admission
  – And Consider Dihydroergotamine (DHE)
Outcome and Cost of Inpatient Hospitalization for Intravenous Dihydroergotamine Treatment of Refractory Pediatric Headache

Gary R. Nelson MD\textsuperscript{a,\*}, James F. Bale MD\textsuperscript{a,b}, Lynne M. Kerr MD, PhD\textsuperscript{a}

\textsuperscript{a}Division of Pediatric Neurology, Department of Pediatrics, University of Utah, Salt Lake City, Utah
\textsuperscript{b}Department of Neurology, University of Utah, Salt Lake City, Utah

\textbf{CONCLUSIONS:} Although intravenous dihydroergotamine is an effective abortive medication for intractable migraine, it may provide only short-term headache relief in many pediatric patients. Hospitalization is relatively costly with only modest long-term benefit, especially in patients with chronic migraine or chronic daily headache.
Summary

• The vast majority of headaches do not require imaging
• History and physical exam can help classify the headaches
• Early treatment before the headache is severe is key for improvement
• Chronic headache management requires a multifaceted approach
References

• Nelson BG, Bale JF, Kerr LM. Outcome and Cost of Inpatient Hospitalization for Intravenous Dihydroergotamine Treatment of Refractory Pediatric Headache. Pediatric Neurology 66 (2017) 76e81
• Guidetti et al. Migraine in childhood: biobehavioural or psychosomatic disorder? The Journal of Headache and Pain (2016) 17:82
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