Pediatric Headaches

James Miles, MD
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1

Disclosures

Relevant Financial Relationship(s)

None

Off Label Usage

None

2

Learning Objectives

- Review the classification of pediatric headaches
- Appreciate when there is a need for further evaluation (red flags)
- Understand the differences between migraine presentation in children and adults
- Discuss migraine treatment, preventative and acute measures

3

Epidemiology

- >90% adolescents report having a headache (HA) by 18 years of age
- 17% kids 4-18 years report having notable recurrent HAs in the past 12 months
- More prevalent in girls after 12 years of age

4

Classification

- Childhood headaches rarely caused by a serious underlying disorder
- Primary: Headache syndromes
  - Can be exacerbated by secondary etiology
  - New headaches could have underlying cause
- Secondary: Underlying condition
  - Infectious illness most common cause of acute pediatric headache

5

Classification: Primary

- Migraine
- Tension-type HA
- Cluster HAs

6

Tension-Type Headaches

- Last 30 minutes to 7 days
- *Bilateral location*
- Pressing or tightening
- Mild to moderate intensity
- Not aggravated by physical activity
- No nausea or vomiting
- No more than one of photo- or phonophobia
- Tx: similar to migraine

7

Cluster Headaches

- Severe unilateral orbital, supraorbital, and/or temporal pain lasting 15 to 180 minutes
- Conjunctival injection and/or lacrimation
- Nasal congestion and/or rhinorrhea
- Forehead and facial sweating
- Miosis, ptosis, and/or eyelid edema
- Sense of restlessness or agitation
- Tx: 100% oxygen or sumatriptan 6 mg IM acutely, verapamil 240 mg daily preventative

8

Classification: Secondary

- Acute febrile illness
  - Most common children
  - Recurrent rhinosinusitis most common misDx
- CNS infection
- Posttraumatic
- Hypertension
- Medication
- Medication overuse
- Brain tumor
- Hydrocephalus
- Intracranial hemorrhage
- Idiopathic Intracranial Hypertension

9

Evaluating the Patient

10

Clinical Presentation: Younger Kids

- Able to attenuate or ignore through play
- Cry, rock, hide
- Chronic pain associated with anxiety, depression, and behavior problems
- May affect ability to eat, sleep, or play

11

History

- Age of onset
  - Anything occur around time of onset?
  - Current triggers?
- Timing, frequency, and pattern
- Location
- Characterizing headaches
  - Dull and achy vs. throbbing
  - "Draw the headache"
- Duration
- Severity

12

History

- Associated signs and symptoms
- Previous evaluations
- Headache hygiene
  - Sleep
  - Water
  - Diet
  - Activity
- Current and previous medications

13

History

- Pregnancy, labor and delivery, neonatal period
- Growth and development
- Major surgeries or hospitalizations
- Chronic illnesses or medications
- Academic performance
- Family History

14

Red Flags

- Young age
- Awakens in middle of night
- Occipital HAs
- Persisting, worsening HA
- "Worse HA of my life"
- New HA
- Recumbent position
- Valsalva maneuver
- Resistant to treatment
- Chronic illness
- **Abnormal neurologic exam**

15

Physical Exam

- Most sensitive indicator of needing further evaluation
- Vital signs
  - Temperature
  - Blood pressure
  - Height and weight
  - Head circumference

16

Physical Exam

- General appearance
- Eyes, ears, nose, and throat
- Head and neck
- Heart and Lungs
- Abdomen
- Skin
- Psychological status

17

Physical Exam: Neuro

- Mental status
- Cranial nerves
- Motor
- *Sensation*
- Reflexes
- Coordination
- Gait

18

Diagnostics

- MRI brain vs. CT head
  - Nonspecific T2 hyperintensities w/ migraine
- MRA vs. CTA
- LP: intracranial infection, subarachonoid hemorrhage, IIH
- CBC, toxicology, thyroid function tests
- EEG not indicated

19

Migraine Headaches

20

Pathophysiology

- Polygenetic and multifactiorial
- Cortical spreading depression
- Serotonin and central pain control pathways
- CGRP

21

Epidemiology

- Prevalence 2.5% <7 yrs, 5% by age 10
- Females>males after puberty
- Lower socioeconomic status associated with chronic migraine
- Family history of migraine common
- 90% adults diagnosed with recurrent sinus HAs actually have migraine HAs

22

Diagnostic Criteria

- At least 5 attacks
- Lasting 4-72 hrs **(2-72 in children)**
- At least 2 of the following:
  - Unilateral **(bilateral in children)**
  - Pulsating/throbbing
  - Moderate to severe pain
  - Aggravation or causing avoidance of physical activity
- At least one of the following:
  - Nausea and/or vomiting
  - Photophobia and phonophobia **(behavioral in kids)**

23

Chronic Migraine

- At least 15 HA days per month for more than 3 months
- Migraine features at least 8 days per month

24

Migraine Subtypes

- Migraine with Aura
  - 14-30% children report aura
  - Typical aura
    - Visual, sensory, and/or speech/language
    - No motor weakness
    - **Gradual development**
    - Typically no longer than 1 hour
    - Complete reversibility
  - Hemiplegic migraine
    - Sporadic vs. familial

25

Migraine Subtypes

- Migraine with Aura
  - Brainstem aura
    - Rare
    - Females>Males
    - 7-20 years of age
    - Vertigo, dysarthria, tinnitus, diplopia, bilateral visual symptoms, bilateral paresthesias, decreased LOC, hypacusis
    - No motor weakness

26

Migraine Subtypes

- Migraine with Aura
  - Vestibular migraine
    - Any age
    - Severe vertigo/dizziness
    - 5-72 hours

27

Migraine Subtypes

- Migraine with aura
  - Retinal/ocular migraine
    - Rare
    - Sudden loss of vision, photopsia, or scintillations in only one eye
    - 5-60 minutes
    - May occur with or without HA, typically uni-ocular
    - **Permanent vision loss may occur**
    - **Fundoscopy: retina pale, constricted vessels**
- Menstrual migraine

28

Migraine Equivalents/Variants

- Cyclic vomiting syndrome
- Abdominal migraine
- Benign paroxysmal vertigo
- Benign paroxysmal torticollis
- Colic?
- Acute confusional migraine
- Alice in Wonderland syndrome
- Opthalmoplegic migraine

29

Migraine Complications

- Status migrainosus: attack lasting >72 hrs
- Persistent aura without infarction
- Migrainous infarction (neuroimaging)
- Migraine aura-triggered seizure

30

Migraine Treatment

31

Lifestyle Modifications

- Education
- Good sleep hygiene
- Adequate water intake
- Routine, healthy meals and snacks
- Regular exercise
- Avoid migraine triggers
- Limit caffeine intake

32

Preventative Medications

- Indications
  - Frequent or long lasting
  - Significant disability or diminished quality of life
  - Contraindication, failure of, or adverse effects of acute therapies
  - Medication overuse HA
  - Menstrual migraine

33

Preventative Medications

- Duration of treatment
  - 6-8 weeks at therapeutic doses for full benefit
  - 6-12 months of good headache control before discontinuing therapy

34

Preventative Medications

- CHAMP trial: placebo is as effective and better tolerated than amitriptyline or topiramate
- Nutraceuticals
  - Riboflavin (Migrelief: 0.5-1 tab BID)
    - Bright yellow/orange urine
    - GI upset uncommon
  - Melatonin (1-3 mg qhs, max 9 mg qhs)
    - Daytime sleepiness
  - Magnesium, feverfew, coenzyme Q10, butterbur, ginkolide B, polyunsaturated fats

35

Preventative Medications

- Cyproheptadine
  - 2-4 mg qhs; max 16 mg per day, divided BID
  - Liquid or tablet
  - Appetite stimulation
  - Somnolence

36

Preventative Medications: Tricyclics

- Amitriptyline
  - 5-12.5 mg qhs, max 2 mg/kg/day or 100 mg qhs
  - Sedating
  - Tachychardia
  - Prolongation of QT interval
    - EKG at baseline and higher doses
- Nortriptyline
  - Less sedating
- Trazodone

37

Preventative Medications: Antiseizure Medications

- Topiramate
  - 1-2 mg/kg/day, max 50 mg BID
  - Weight loss, cognitive impairment, paresthesias, closed-angle glaucoma, hypohydrosis, nephrolithiasis
  - Potentially lowers efficacy of OCP's
  - Teratogenicity and LBW

38

Preventative Medications: Antiseizure Medications

- Valproate
  - 10-15 mg/kg/day divided BID
  - Weight gain, hepatotoxicity (<2 yrs), thombocytopenia
  - Teratogenic
  - CBC, AST, ALT
- Gabapentin
  - TID dosing
  - Restless leg syndrome or neuropathic pain
- Levetiracetam

39

Preventative Medications: Beta Blockers

- Propranolol
  - 1 mg/kg/day divided TID (multiple doses per day)
  - Abdominal migraines, anxiety, tremor
  - Hypotension, bradycardia, emotional disturbances, nightmares
  - Monitor HR and orthostatic BP (tall/skinny/active patients)
  - Use caution in patients with asthma, diabetes, depression
- Propranolol LA
- Atenolol
  - Beta-1 selective blocker, can be safer than nonselective beta blockers (propranolol)

40

Neurostimulation

- Trancutaneous electrical nerve stimulation (TENS)
  - Cefaly device
  - Preventative and acute treatment
  - Drowsiness, well tolerated
  - Costs ~$500, insurance typically doesn't cover

41

Neurostimulation

- Remote Electrical Neuromodulation (REN)
  - Nerivio device
  - Stimulates nociceptive nerve in the upper arm→ sends messages to the pain regulation centers in the brainstem→ activates the descending pain inhibitory pathways→ serotonin and norepinephrine are released
  - Preventative and acute treatment
  - Temporary warm sensation, tingling, numbness, or pain in the arm, red skin, or muscle spasm (2% or less)
  - FDA approved 8 years and older

42

Neurostimulation

- Transcranial magnetic stimulation
  - 0.9 Tesla magnetic field in a brief pulse over occipital area
  - Preventative and acute treatment
  - Can cost up to $12,000, $500 per session, several sessions over multiple weeks

43

Botulinum toxin

- Shown to decrease number of headache days in adults with chronic migraine
- Retrospective studies in children show similar results, clinical trial recently showed no benefit
- IM injections every 12 weeks
- Neck/musculoskeletal pain, facial drooping
- Must fail 2-3 prescription medications
- Yearly cost $14K, typically well covered by insurance

44

CGRP Antagonists

- CGRP: found in unmyelinated sensory nerve fibers
  - Associated with transmission of painful stimuli
- Monoclonal antibodies to CGRP or its receptor have been shown to be effective in adults
- MOST not approved for <18 years
  - Poorly covered by insurance, yearly cost >$7K
  - Exc. AJOVY approved for **6-17 years**, 45 kilograms (99 pounds) or more.

45

Other Preventative Treatments

- Behavioral therapy
  - Cognitive behavioral therapy
    - Clinical trial showed benefit in children with CBT+amitriptyline vs. HA education+amitriptyline
    - Comorbid anxiety and depression VERY common
  - Biofeedback
  - Limitations: availability, cost, patient ability and compliance

46

Other Preventative Treatments

- Physical therapy
  - Chronic migraine
  - Head injury/concussion
  - Other comorbidities

47

Other Preventative Treatments

- Other
  - Chiropractics
  - Massage therapy
  - Acupuncture/acupressure
  - Daith piercing
  - CBD and medical marijuana
  - Hyperbaric chamber

48

Menstrual Migraine

- Migrelief+M
- Hormonal therapy
- "Mini-prophylaxis"
  - 1-2 days prior to expected headache onset
  - Continued for expected duration
  - Naproxen 550 mg BID
  - Long acting triptans

49

Acute Treatment

- General measures
  - Dark, quiet room
  - Cool cloth applied to forehead
- NEVER USE:
  - Opioids
  - Barbituates
  - Benzodiazepines

50

Acute Treatment

- Analgesics
  - Ibuprofen 10 mg/kg or acetaminophen 15 mg/kg
    - Onset of migraine symptoms, can repeat in 2 hours
  - Naproxen 5 mg/kg every 8-12 hours
  - Excedrin Migraine 1 tablet
    - Adolescents only due to aspirin
  - No more than 2 doses per day, 2 days per week
  - Can take with caffeine.

51

Acute Treatment

- Triptans
  - 5 years of age and older
  - Refractory to analgesics
  - Onset of migraine symptoms, can repeat in 2 hours
  - No more than 2 doses per day, 2 days per week
  - Can take with caffeine

52

Acute Treatment

- Triptans
  - Sumatriptan 25-50 mg oral, 5-10 mg nasal
  - Rizatriptan 2.5-5 mg oral or dissolvable
  - Zolmitriptan 2.5-5 mg oral, dissolvable, or nasal
- Nasal sprays: tilt head forward, hard candy
- Contraindications: Hx ischemic vascular disease or arrhythmias a/w accessory conduction pathway d/o's
- Caution: brainstem aura and hemiplegic migraine

53

Acute Treatment

- Combination
  - Same time: triptan + naproxen
  - Severity based: analgesic mild to mod, triptan severe
- Antiemetics
  - Promethazine 0.25-0.5 mg/kg per dose
  - Ondansetron 4 mg every 8 hours

54

Status Migrainosus

- Clinic/Urgent Care
  - Ketorolac 15-60 mg IM + antiemetic
- Emergency setting
  - IV fluids 20 mL/kg NS, max 1 L
  - IV ketorolac
  - IV antiemetic (ex. Prochlorperazine)
- DHE: caution with brainstem aura and hemiplegic migraine
- IV valproate

55

Prognosis

- Many patients improve over time
  - Rule of thirds
- Girls more likely to relapse
- Early age may mean a less favorable prognosis

56

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57

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58

Questions?

59