

**Pediatric Headache:
A Complex Problem**

Lynn Clark RN, PNP-BC
Alicia Haag RN, FNP-C


Learning Objectives:

Objective 1:
The participant will be able to differentiate between the 4 main types of primary headaches, as well as secondary headaches caused by medication overuse and psychological overlay.

Objective 2:
The participant will be able to obtain a comprehensive history in a pediatric patient presenting with headache.

Objective 3:
The participant will be able to recognize the essential aspects of a physical exam in children presenting with headache.

Objective 4:
The participant will be able to identify pharmacological treatments for headache and the indications for differing types.



Learning Objectives:


Objective 5:
The participant will be able to identify complementary and alternative therapies that can be helpful for treating headaches in children.

Objective 6:
The participant will be able to identify reasons for neuroimaging overuse and the harms of radiation exposure.

Objective 7:
The participant will be able to identify indications for neuroimaging in pediatric headache patients.

Objective 8:
The participant will be able to differentiate clinical characteristics of migraines vs. epilepsy.


Objective 9:
The participant will be able to summarize the treatment of headaches in children.



Headaches in Children Epidemiology

- Incidence of chronic or recurrent headache:
40% by age 7 years.
75% by age 15 years.
- Headache complaints account for 10% of all referrals to Neurologists
- 3,800 CNS tumors are diagnosed each year in children under the age of 20
- Gender Ratios:
 - Age 3-7 Boys > Girls
 - Age 7-11 Boys = Girls
 - Age 15 Girls > Boys


(Lopez, & Rothrock (2008); American Cancer Society.)



Etiology of Recurrent Headaches:


1. Migraine (with or without aura)
2. Tension-Type Headache (TTH)
- ?. Psychogenic Component
 - Depression, school problems, malingering, conversion disorder
3. Chronic Daily Headache (CDH)
4. Medication Overuse Headache (MOH)
5. Cluster Headache

(IHS, 2003)



Migraine Without Aura:


- > 5 attacks fulfilling the following:
 - Headache lasting 4 – 72 hours (untreated or unsuccessfully treated)
- At least 2 of the following:
 - Unilateral quality
 - Pulsating quality
 - Moderate or severe pain intensity
 - Aggravation by or causing avoidance of routine physical activity
- At least 1 of the following:
 - Nausea and or vomiting
 - Photophobia or phonophobia
- Not attributed to another disorder



Migraine with Aura

- Same as without Aura and in addition:
- At least one of the following, without motor weakness:
 - Fully reversible visual symptoms
 - Fully reversible sensory symptoms
 - Fully reversible dysphasic speech disturbance


(IHS, 2003)



Migraine with Aura


- At least two of the following:
 - Homonymous visual symptoms and/or unilateral sensory symptoms
 - At least one symptom develops gradually over ≥ 5 minutes and/or different aura symptoms occur in succession over ≥ 5 minutes
 - Each symptom lasts ≥ 5 minutes & ≤ 60 minutes
 - Migrainous symptoms occur during the aura or within 60 minutes of the aura

(IHS, 2003)




Tension-Type Headache (TTH)

- Lasting 30 minutes to 7 days
- At least 2 of the following:
 - Bilateral location
 - Pressing/Tightening (non pulsatile)
 - Mild/Moderate intensity
 - Not aggravated by routine physical activity (walking/climbing stairs)
- Both of the following:
 - No nausea or vomiting
 - May have phonophobia or photophobia, but not both




Chronic Daily Headache (CDH):

- Chronic daily headache often has the characteristics of tension-type headache, migraine or frequently both.




Four Main Types of CDH:

- Transformed Migraines (TM)
- Chronic Tension-Type HA (CTTH)
- New Daily Persistent HA (NDPH)
- Hemicrania Continua



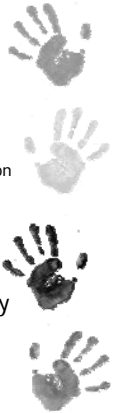
Medication Overuse Headache (MOH)

- Regular use of a medication > 3 months of one or more acute/symptomatic treatment drugs:
 - Ergotamine, triptans, opioids, or combination analgesic medications > 10 days a month on a regular basis for > 3 months
 - Use of multiple analgesics/ triptans > 15 days per month for > 3 months



Cluster Headache


- Severe periorbital pain lasting 15 – 180 minutes (untreated)
- At least one of the following:
 - Ipsilateral conjunctival injection and/or lacrimation
 - Ipsilateral nasal congestion or rhinorrhea
 - Ipsilateral eye lid edema
 - Ipsilateral forehead and facial sweating
 - Ipsilateral miosis and/or ptosis
 - A sense of restlessness or agitation
- Attacks have a frequency of one every other day to 8 per day



Pertinent Questions


- Onset
 - Sudden with a specific date vs. gradual
 - Post concussive headaches
- Location
- Intensity
- Quality
 - Aching, stabbing, throbbing, pulsating
- Frequency
 - Number of headache days per month
- Duration
 - amount of time each headache lasts
- Pattern
 - Constant, intermittent, clustered

(Brenner et al, 2008)




Temporal Patterns


Acute Headache





Acute-Recurrent Headache




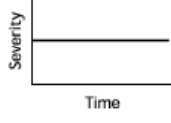
(Lewis, 2002)





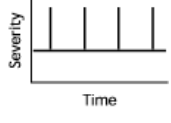
Chronic- progressive Headache (most ominous)



Chronic-nonprogressive (or chronic-daily) Headache







Mixed Headache







Pertinent Questions

- Aggravating factors
- Alleviating factors
- Prodromal Symptoms
 - Before aura
- Aura
 - 60 minutes before headache begins
- Accompanying symptoms




Practical Classification in Peds:

Photophobia or phonophobia
+
Inability to continue activities
+
Nausea / Vomiting
=
Migraine
+
Aura
=
Migraine with Aura




More questions

- Functional Assessment
 - Interference with ADLs, school attendance, extra-curricular/social activities
- Sleep
 - Wake up during the night
 - Prevent falling asleep
 - HA present on awakening
- Diet
 - Does the child eat regular meals
 - Is hydration adequate
 - Caffeine intake



Stress Assessment


- Family stress
- School stress
- Life changes
- Life events as triggers
- Changes in behavior
- PTSD



Physical Examination

• Growth	• Jaws and Mouth
• Vital Signs	• Ears
• General	• Cervical Spine
• Skin	• Neurological System
• Head and Neck	
• Eyes	

(Gunner & Smith, 2008)



Normal Neuro Exam

- Mental status exam: Pt was alert, oriented in person, time and space, Cooperative to the exam and had a fluent speech.
- The cranial nerve examination showed pupils equal and reactive to light. Visual acuity and visual fields by confrontation were within normal limits. Optic fundi revealed no disc edema. Extraocular movements were completely normal. There was a normal facial sensation and jaw movements were within normal limits. There were normal facial movements and hearing was normal. There was symmetrical elevation of the soft palate and both sternocleidomastoids were strong. There was no tongue deviation upon protrusion.
- Motor examination revealed a normal bulk, tone and strength throughout. Reflexes were normal and there was a down going plantar response.
- Sensory examination showed a normal light touch, pinprick, vibration and proprioception.
- Cerebellar examination showed no dysmetria or intention tremor with the finger to nose maneuver. The heel to shin maneuver was within normal limits. Rapid alternating movements were within normal limits.
- Gait, including tandem gait, was within normal limits.

Treatments

- Treat the cause in secondary HA:
 - Increased ICP, Stress Response
- Avoid precipitating factors
 - Dietary triggers
 - Caffeine intake
 - Lack of sleep
 - Medication overuse
 - Eyestrain



(Unger, 2007; Smith, 2007, Lewis, 2002)

Pharmacologic Treatment

Rescue:


- Acetaminophen
- NSAIDS
 - Ibuprofen, Ketorolac, Indocin, Naproxen
- ASA/ butalbital/ caffeine (Fiorinal)
- Isometheptene mucate – dichloralphenazone - acetaminophen (Midrin)
- APA/ASA/Caffeine – Excedrin Migraine
- Opioids



Pharmacologic Treatment

Abortives:


- **Triptans**
 - Sumatriptan (Imitrex)
 - Zolmitriptan (Zomig)
 - Rizatriptan (Maxalt)
 - Almotriptan (Axert)
 - Only non-off label drug – it's approved for kids 12-17 years old
 - Frovatriptan (Frova)
 - Naratriptan (Amerge)
 - Eletriptan (Relpax)



Limitation Guidelines for Use of Abortive Therapies in Headache

SUBSTANCE/MEDICATION	GUIDELINES Treatment day = 24 hours
Caffeine	2 treatment days/week. Both dosage and frequency of use affect development of withdrawal headaches or symptoms. Caffeine from beverage consumption also contributes to total dosage.
Codaine	2 treatment days/week
Oxycodone	2 treatment days/week
Butorbital	2 treatment days/week
Propoxyphene	2 treatment days/week
Butorphanol	2 treatment days/week
Ergotamine tartrate: oral (p.o.), rectal, sublingual	8 treatment days/month or 2 treatment days/week (or less)
Almotriptan	8 treatment days/month or 2 treatment days/week
Eletriptan	8 treatment days/month or 2 treatment days/week
Frovatriptan	8 treatment days/month or 2 treatment days/week
Sumatriptan succinate: subcutaneous (SQ), p.o., rapid-release tablet, intranasal	8 treatment days/month or 2 treatment days/week
Naratriptan hydrochloride: p.o.	8 treatment days/month or 2 treatment days/week
Rizatriptan benzoate: p.o. and orally disintegrating tablet	8 treatment days/month or 2 treatment days/week
Zolmitriptan: p.o., oral disintegrating tablet, intranasal	8 treatment days/month or 2 treatment days/week


Note: In general, the use of opiates/opioids for the symptomatic management of pain should be limited to instances in which acute abortive therapy has failed or is contraindicated. Opioids, as a class, should be limited to no more than 2 days/week, regardless of which agent is used. However, when they are used, they should be administered at a sufficient dose to provide adequate analgesia.



Prophylactic Treatment


- Antihistamine**
 - Cyproheptadine (Periactin)
- Antidepressant**
 - Amitriptyline (Elavil)
- BetaBlocker**
 - Propranolol (Inderal)
 - Metoprolol tartrate (Lopressor)
- Anticonvulsants**
 - Valproic acid (Depakene)
 - Carbamazepine (Tegretol)
 - Topiramate (Topamax)
 - Gabapentin (Neurontin)
- NSAIDS**
 - Naproxen Sodium (Anaprox)

(Lewis, 2002)



Alternative pharmacology


- **Muscle Relaxants**
 - Tension headaches
 - Tizanidine (Zanaflex)
 - Cyclobenzaprine (Flexeril)
- **Anti-emetics**
 - Ondansetron (Zofran)
 - Promethazine (Phenergan)
 - Trimethobenzamide (Tigan)
 - Metoclopramide (Reglan)
 - Hydroxyzine (Vistaril)



Nonpharmacological Modalities:

- **Biofeedback**
 - Thermal Biofeedback
 - Electromyographic Biofeedback
- **Guided Imagery, Relaxation, Self-Hypnosis**
 - Hypnosis is more effective than Beta Blockers in preventing pediatric migraine
 - Training available through:
 - -American Society for Clinical Hypnosis
 - -Society for Developmental and Behavioral Pediatrics
- **Cognitive Behavioral Therapy (CBT)**
- **Autogenic Training**
- **Exercise**

(Kemper & Breuner, 2010)



Nonpharmacological Modalities:


Essential Nutrients:

- Vitamin B2
- Calcium
- Magnesium
- Fatty Acids

Dietary Supplements:

- Butterbur
- Feverfew
- 5 Hydroxytryptophan (HTP)
- Coenzyme Q10

(Kemper & Breuner, 2010)




Nonpharmacological Modalities:

Professionally Provided Modalities:

- Massage Therapy
- Chiropractic Care
- Acupuncture
- Homeopathy

(Kemper & Breuner, 2010)



Possible Explanation for Neuroimaging Overuse:


Physician Behaviors	Consumer Expectations
Time constraints	Parental expectations/demands
Physician anxiety/fear of liability	Parental anxiety/fear of pathology
Unreliable history/exam	Exaggeration of symptoms severity
Indoctrination of imaging technology	Parental reassurance-anxiolytic use of technology
Misunderstanding of guidelines	Mistrust in physician reassurance
Delayed neurology consult	Direct-to-consumer marketing of imaging centers
Financial/Reimbursement Incentives	Delayed neurology consult
Belief in need to document normal imaging studies	Medicalization of childhood stress phenomena

(Graf, Kayyali, Alexander, 2008)

Our Stubborn Quest for Diagnostic Certainty...

- Head CT radiation exposure is equivalent to approximately 100 chest radiographs
- Cancers commonly associated with radiation exposure:
 - Leukemia
 - Breast CA
 - Thyroid CA
 - Lung CA
 - Stomach CA
- Children are at increased risk d/t:
 - Increased radiosensitivity
 - Longevity of years remaining


(Evans, 2009)



Consider Neuroimaging:

Headache Features: "First" or "Worst" Rapidly increasing frequency and severity Awakening from sleep d/t pain Non-responsive to treatment
Demographics Patients with : Cancer / HIV / Epilepsy New headaches after age 50 Young children (< age 3-5)
Associated Signs / Symptoms Fever, stiff neck, nausea and vomiting Focal neurological symptoms Papilledema Cognitive impairment / personality change


(Evans, 2009)



Secondary Causes for Headache: Intracranial

Structural Arachnoid Cyst Tumor Hydrocephalus Chiari Malformation Pseudotumor Cerebri Head Trauma CSF Leak Vascular Malformations (Arteriovenous Malformation)
Infection Encephalitis Meningitis
Inflammatory Acute Disseminated Encephalomyelitis Multiple Sclerosis Vasculitis
Epilepsy


(Ahad, 2008)



Structural Abnormalities:

- Arachnoid Cyst
- Hydrocephalus
- Chiari Malformation
- Pseudotumor Cerebri

(Ahad, 2008)




Structural Abnormalities:

Arteriovenous Malformation


- Rare, Incidence is 1:100,000 children per year
- 77% of children with hemorrhagic stroke presented with complaints of headache
- Only 40% described a sudden onset

Ahad, 2008



Epilepsy and Headaches:

- Seizures are the most common secondary cause of headaches
- 65% of epilepsy patients had comorbid migraines
- Headaches can occur:
Before seizure activity-Preictal Headaches
During seizure activity- Ictal Headaches
After seizure activity- Postictal Headaches



Differentiation of Migraine vs. Epilepsy:


Symptom	Migraine	Epilepsy
Onset	Gradual (minutes)	Abrupt (seconds)
Duration	Hours	Minutes
Consciousness	May be slightly altered	Nearly always altered
Visual Aura	Black and white, Linear/zigzag	Colored, Rounded
Sensory Aura	Migrating paresthesias	Brief/sharp/cramping pain
Timing of HA	During event symptoms	Occurs after symptoms
Family History	Typically positive	Occasionally positive
Daily Occurrence	Occasional	Rare
Sleep Disturbance	Less frequent	More frequent
Focal Deficits	Weakness	Weakness post convulsion
Aphasia	Rare	Common

(Ahad, 2008)

Summary:

1. Establish a diagnosis
 - Primary vs Secondary Headaches
 - Progressive vs. Nonprogressive Headaches
2. Assess the degree of disability and impact on the child's quality of life.
 - Evaluate school attendance and school performance, especially in the areas of attention, math, and performance.
 - consider a stress or depression-related etiology if child is often absent from school and the headaches affect other family members' ability to work or participate in outside activities.
3. Educate the child and family about the condition and risk/benefits of treatment options..


(Gunner, Smith, Ferguson, 2008)



Summary:

4. Establish realistic expectations
 - Set appropriate goals
 - Discuss the expected benefits of therapy and time course to achieve them
 - Empower the patient and family to be involved in management (such as tracking progress with a headache diary or calendar)
5. Create an individualized, formal management plan
 - Consider the patient's response to and tolerance for specific medications.
 - Consider co-morbidities and treatment options dictated by these conditions (for example, children with depression may benefit from antidepressants as migraine prophylaxis, and those with asthma should not take -blockers as migraine prophylaxis).
 - Encourage recognition and avoidance of triggers

(Gunner, Smith, Ferguson, 2008)



References:

Ahad, R. & Kossoff, E. H. (2008). Secondary intracranial causes for headaches in children. *Current Pain and Headache Reports*, 12, 373-378

American Cancer Society.

Brenner, M., Oakley, C. & Lewis, D. (2008). The Evaluation of Children and Adolescents with Headache. *Current Pain and Headache Reports*, 12: 361-66.

Evans, R. W. (2009). Diagnostic testing for migraine and other primary headaches. *Neurologic Clinics*, 27, 393-415.

Graf, W. D., Kayyali, H. R., Alexander, J. J., Simon, S. D. & Morriss, M. C. (2008). Neuroimaging: use trends in nonacute pediatric headache before and after clinical practice parameters. *Pediatrics*, 122, 1001-1005.

Gunner, K. B., Smith, H. D., Ferguson, L. E. (2008). Practice guidelines for diagnosis and management of migraine headaches in children and adolescents: part two. *Journal of Pediatric Healthcare*, 22 (1), 52-59.

Headache Classification Subcommittee of the International Headache Society (2004). The International Classification of Headache Disorders (2nd ed.). *Cephalalgia*, 24 (1), 1-120.

Kemper, K. J., & Breuner, C. C. (2010). Complimentary, holistic, and integrative medicine: headaches. *Pediatrics in Review*, 31, 17-23.

Lopez, & Rothrock (2008). Headache: Pediatric Perspective: Lewis, D. (2002). Headaches in Children and Adolescents. *American Family Physician*. 65 (4), 625-32.

Smith, T. (2007). The Acute Treatment of the Migraine Attack. *The Pain Practitioner*. (17) 1, 21-29.

Unger, J. (2007). Migraine Prophylaxis. *The Pain Practitioner*. (17) 1, 32-40.
