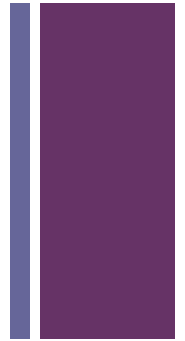


Pediatric Headache Management and Considerations

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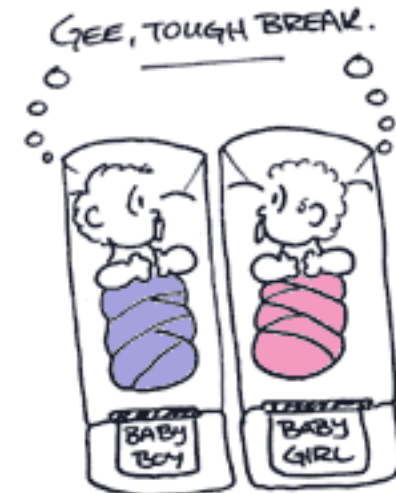
+ OBJECTIVES

- Recognize indicators for secondary headache in both exam and history
- Review common and uncommon primary headache types
- Catching important co-morbidities for Primary headache
- Walk through case of pediatric headache evaluation and management

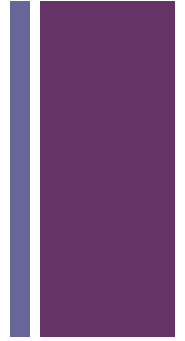


+ Epidemiology of kid's headaches

- **Migraine** is common in childhood, with a prevalence of 1% to 3% in **children** age 3 to 7 years and 8% to 23% in children <18yo
- For comparison, Childhood asthma (<18yo) ranges from 5-12%
- Age/Gender disparity
 - 4-7 years old, boys >girls,
 - 10+ girls > boys



+ Considering secondary cause



- Intracranial (consider imaging or ED evaluation)
 - EXAM: Papilledema, Cranial nerve palsy, focal deficit, multiple café-au-lait
 - Confusion, recurrent fever and/or nuchal rigidity
 - Sudden change in headache
 - Vision loss (intermittent or progressive)
 - Nocturnal or positional headache
 - Sudden severe or “thunderclap” headache
 - Acute/new headache (< 6-month duration)*
 - New headaches after an injury/trauma (<1month)*
- Sleep disorder (daytime somnolence, hypersomnia, obesity, tonsillar hypertrophy)
- Metabolic (unexplained weight loss/weight gain, recurrent fevers, rashes, joint pain or joint swelling, excessive thirst or urination)

+ Other considerations

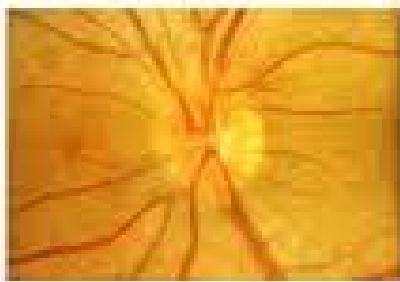
	Variant	Pathology
Medications	growth hormone, isotretinoin/Retinol, OCP, steroid withdrawal, tetracyclines, sulfamethoxazole/trimethoprim	Idiopathic Intracranial Hypertension (IIH)
Medical history	immunosuppression (HIV, Cancer)	Malignancy, cerebral vasculitis
	Obesity, HTN	IIH, Cushing's syndrome, Metabolic syndrome
	hypercoagulable state (ie pregnancy)	Cerebral sinus venous thrombosis
	Recurrent sinusitis	Abscess, cerebral sinus venous thrombosis
	Thyroiditis, Diabetes, SLE, Chron's/Ulcerative colitis, Sjogrens, Rheumatoid arthritis	Cerebral Vasculitis
Menses	Absent, irregular or excessive	Anemia
Environmental	siblings with worsening headache, vomiting, cognition, mood	Carbon monoxide, lead exposure

+ The role of imaging

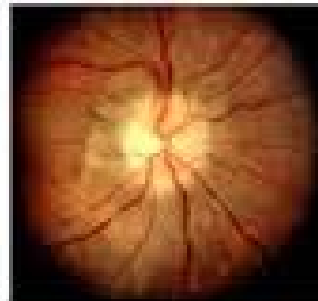
Childhood Brain Tumor Consortium (3,291 subjects)

- 94% of children with brain tumors had abnormal neurologic findings (**gait disturbance, abnormal reflexes, cranial nerve findings, and altered sensation**)
- 60% had **papilledema or increased intracranial hypertension** causing the optic nerve inside the eye to swell. **Can also cause CN VI palsy**
- Symptoms: vision changes, positional headache, vomiting

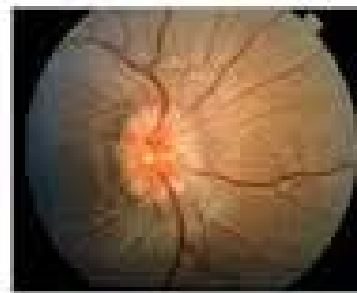
(<https://www.ncbi.nlm.nih.gov/pubmed/29724429>).



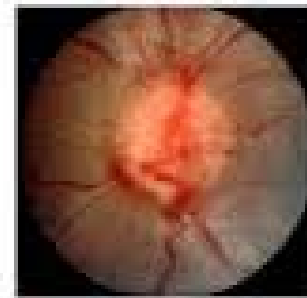
Normal
Optic disc



Papilledema
Grade 1



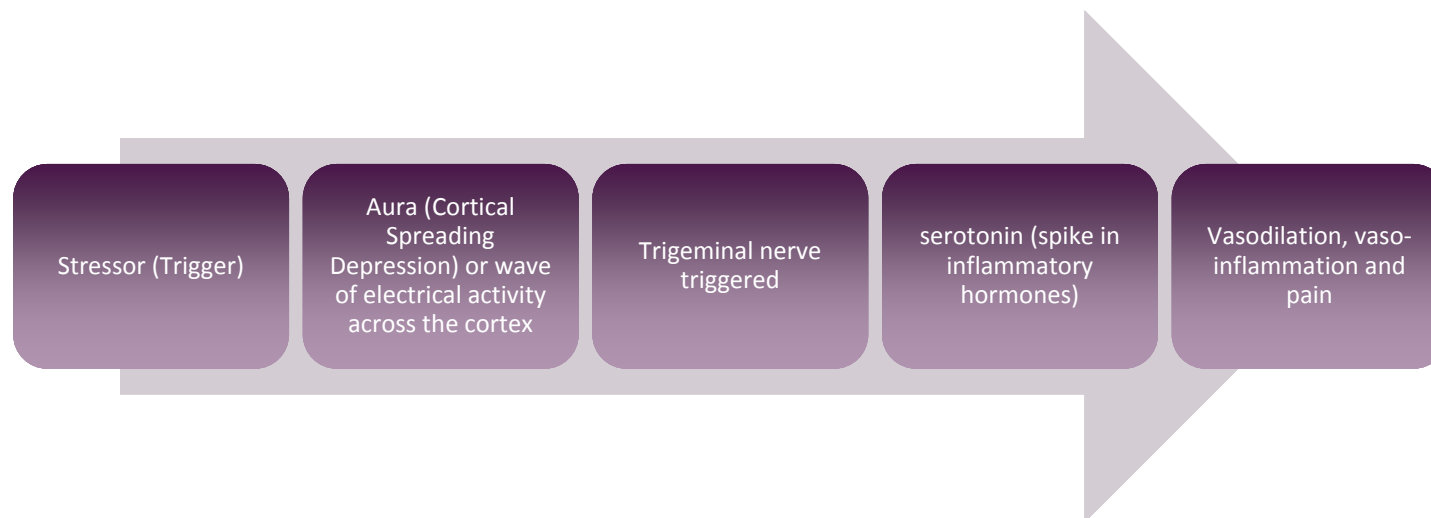
Papilledema
Grade 2



Papilledema
Grade 4

+ Pediatric primary headache

- Recurrent but stable headache course >6months
- Bifrontal or bitemporal distribution, midday onset
- Variable frequency and disability
- Absence of focal neurologic deficits or nocturnal headache
- Improves over times of less stress (summer)
- Most are mixed Tension headache and Migraine. Light and sound sensitivity can accompany alone but only migraine elicits both or emesis



+ Case study of pediatric headache

8 yo F “Lexi” presents for headache evaluation



■ History of Present Illness

- Chronic recurring headaches since 3-4 yo
- Progression to bifrontal near-daily (4-7x/wk) headache in last 6 months
- New headache waking from sleep
- Intermittent light sensitivity, dizziness
- Not missing school but skipping activities for headache

■ Important Negatives

- No correlating injury or illness
- No emesis, sound sensitivity, injury, fevers, weakness, sensory or speech changes
- No staring/syncope/spells of AMS
- No vision changes
- No behavior concerns
- No new medications or diagnoses
- No recurring rashes, abdominal pain, joint pain/swelling, polyphagia/polydipsia, weight loss/weight gain

■ PMH/development

- Chronic allergies -daily allergy medications
- Concussion 5 yo: struck head on diving board. + AMS and emesis. CT head and c-spine neg. Symptoms resolved over several hours
- Normal birth history and early development
- 2nd grade, no retention but behind in reading, receiving some tutoring. Possible focus issues
- No surgeries, prolonged illnesses

■ Medications

- fluticasone, montelukast, cetirizine daily
- Ibuprofen 5mL prn (1-3x/week) prn headache

■ Family Hx

- Mom –migraine – receives botox
- Dad – motion sickness
- PGGF: several early strokes (<40yo) with cardiovascular issues



Case study: 8 yo F with headache

Question 1

- Which red flags warrant neuroimaging in the information we have so far? May be more than one answer.
 - A. Chronic recurring headaches since 3-4 yo with progression to nearly daily frontal headache x 6 months
 - B. New nocturnal headache
 - C. Significant concussive event at 5 yo
 - D. Current age of 8 yo



+ Case study: 8 yo F with headache

Exam – essentially normal

VS/Measurements

- Temp: 97(F), HR: 88, BP: 87/55
- Wt: 21.30 kg (7th%ile)
- Ht 119.80 cm (4th%ile)

GENERAL

- Head and Neck: Head is symmetric. Nares were patent and mouth was moist. Neck was supple with no nodes and full range of motion. Palpation elicited no pain over sinus or scalp.
- No dysmorphic features
- Back: no curvature or deformity
- Skin: no rash or café-au-lait lesions
- Chest/Extremities/Abdomen: unremarkable

NEURO

- Mental status as expected; Able to produce 2+2, 8-6 and 8x2.
- Fundoscopy: No papilledema
- CN II-XII intact
- Speech/Motor without deficit
- Gait: normal, Romberg negative
- Reflexes/DTR: 2+ throughout
- **Work up to date**
 - Sleep study normal
 - CT head at 5 yo, no MRI
 - No formal eye exam
 - No formal academic testing



Case study: 8 yo F with headache

Question 2

- What type of diagnostic studies would you consider for this child based on information so far?
May be more than one answer
 - A. MRI brain with and without contrast
 - B. CT scan
 - C. Metabolic screening labs
 - D. Neuropsychology evaluation
 - E. Sleep study



+ Case study: 8 yo F with headache

Partial recommendations

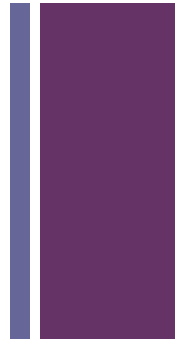
1. MRI of the brain with and without contrast (with sedation)
2. Dilated eye exam
3. Evaluation with Neuro-Psychologist (or can request school for formal IEP testing)

(Sleep study already done last year)



+ Daily Living Stressors

the first line of defense



Sleep

- Gasping, snoring, restless, bedwetting, hard to wake up, daytime naps
- Sleep hygiene (late bedtime, late rise, electronics use)
- Weekends bedtime/rise time skewed
- Bedtime
 - <5y=12hrs/night
 - <10y=11hrs/night
 - <15y=10hrs/night
 - <18y=9hrs/night

Diet

- Skipped meals or infrequent meals in young child
- **Caffeine** (decaf, Starbucks, other sodas, sweet tea, energy drinks)

Hydration (1 oz= 1kg, max 80oz/day)

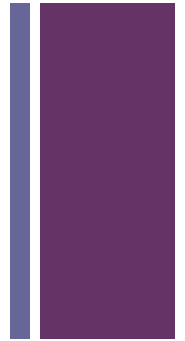
Exercise

Toxins (Drug/Alcohol/Tobacco or vaping exposure) (ie Nicotine poisoning or Propylene Glycol)

+ Case study: 8 yo F with headache

■ Daily habits

- Sleep: 8:30/9:30 - 6:30, weekends 9pm-6:30am. Uses electronics at bedtime. Does not nap but is sleepy in class. Can occasionally snore.
- Skipped meals/MSG: none with 2 snacks/day
- Water: 8-10 oz/day
- Exercise: several sports
- Caffeine: occasional



+ Case study: 8 yo F with headache

Question 3

- Based on the information so far, what preventative lifestyle measures would be most helpful? (Wt=21kg)

May be more than one answer

- A. Corrected sleep time on both weekdays and weekends with no electronics and 10-11 hours of sleep
- B. 60oz/water/day
- C. More exercise
- D. Stop all caffeine

+ Case study: 8 yo F with headache

Additional Recommendations

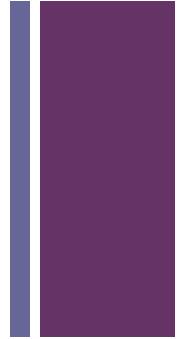
3. Habits

- Sleep: 10-11 hours/night. Limit variation from Summer to weekends to school days. No electronics 2 hours before bedtime. Consider use of Melatonin nightly if needed.
- Hydration: 25-30 oz/water/day. Avoid Kool-aids/flavored juices
- Caffeine: avoid all caffeine/decaf products
- Exercise: goal of 20 min running/biking/walking per day.
- Diet: Avoid skipping meals. Goal of 2 fruits and 2 vegetables/day. Avoid fast food.



+ AAN Practice Guidelines

Chronic Treatment (*August 2019*)



- Headache more than 6 days in a month is a **risk factor for chronic migraine** and medication overuse
- Topiramate is the only FDA-approved medication for migraine prevention (in children and adolescents aged 12 to 17 years)
- However, the majority of randomized, controlled trials studying the efficacy of preventive medications for pediatric migraine failed to demonstrate superiority to placebo (includes Amitriptyline and Topiramate and Propranolol)
- Amitriptyline: black box warning - risk of suicidal thoughts and behavior within pediatric population
- Topiramate/Depakote: Counseling for teratogenic effects
- Cyproheptadine: rarely effective in > 5-6 yo for headache alone due to dosing needs. Side effects: significant sedation and weight gain

+ AAN Practice Guidelines

Acute Treatment (*August 2019*)

Medication	Dosing	Frequency
Ibuprofen/Motrin (OTC)	10mg/kg (max 800mg)	May rpt in 6 hours; 3 treatment days/week
Acetaminophen (OTC)	10-15mg/kg (max 1000mg)	May rpt in 4 hours; 3 treatment days/week
Naproxen (OTC) Option Treximet (Imitrex+Naproxen)	5-7mg/kg (max 500mg)	May rpt in 8 hours; 3 treatment days/week
Sumatriptan (Imitrex) 12yo+ *see contraindications	>12yo 25mg-50mg	May rpt in 2 hours; 2 doses in 24 hours, 2 treatment days/week
Rizatriptan (Maxalt) 6yo+ *see contraindications	5-10mg <40kg 10-20mg >40kg	May rpt in 2 hours; 2 doses in 24 hours, 2 treatment days/week
Antiemetics/Anti-dopaminergic <ul style="list-style-type: none"> Ondansetron (Zofran) Promethazine (Phenergan) Prochlorperazine (Compazine) 	See referencing	Typically only used at onset or as needed for nausea/emesis

- ❖ Choose 1 or 2 agents with clear instructions/written plan
- ❖ Ensure weight appropriate and timed with headache onset
- ❖ Provide appropriate school medication form
- ❖ Avoid Barbiturates/Opioids/Excedrin Migraine/Caffeine
- ❖ *Triptans contraindicated with hemiplegic/basilar migraine or prolonged aura, stroke, wolf-Parkinson-white*



Case study: 8 yo F with headache

Question 4

- Based the child's age (8yo), weight (21kg) and medical history, what medication plan would you recommend?
 - A. Cyproheptadine 8mg twice daily
 - B. Topiramate 25mg nightly
 - C. Ibuprofen 200mg at onset with option to repeat in 6 hours, limited to 3 treatment days/week
 - D. Sumatriptan (Imitrex) 25mg at onset of headache





Case study: 8 yo F with headache

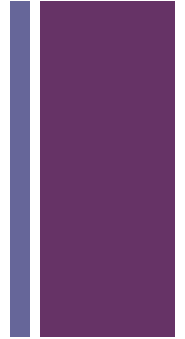
Additional Recommendations



4. Acute medication plan
 - At headache onset: Take Ibuprofen 200mg (10mL) + 12 oz sports drink over 20-30min.
 - 6 hours later for continued pain: Repeat Ibuprofen 200mg + 12 oz sports drink over 20-30 min.
 - If headache reoccurs in 24 hours this is considered the same headache. Do not use abortive medication, use only sports drink to treat.
 - Use this headache plan only 3 treatment days out of seven-day week.
 - Medication forms for school

5. No daily medications were prescribed

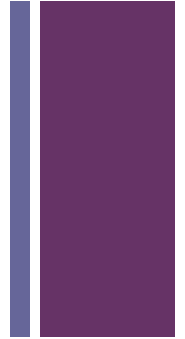
+ Linking Emotional Stress and Chronic Pain



- 2010 study isolated 8 variables – Each group demonstrated a significant increase in chronic headache as an adult compared to control
 - emotional, physical, or sexual abuse
 - witnessing domestic violence
 - growing up with mental illness in the home
 - having household members who were incarcerated or were abusing drugs
 - experiencing parental separation or divorce
- Additional studies show pediatric migraine patients have higher incidence of:
 - Attention deficit hyperactivity disorder or Learning disability
 - Anxiety
 - Depression/SI
 - Tourette syndrome
 - Obesity/sleep disorders

+ Screening for stressors and safety

Consider for persistent or chronic cases



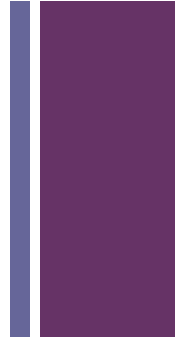
- Mood/mental health/Social
 - Focus/impulsivity symptoms
 - Learning disability
 - Anxiety/compulsion
 - Past childhood trauma, abuse, neglect
 - Depression or suicidal thoughts
 - Alcohol/drug/tobacco exposure
 - Past or ongoing sexual assault
- School (*Failing grades, new school, Lost IEP, Bullying*)
- Home (*Divorce, Domestic violence, Death/illness, Advanced responsibilities*)
- Work/Sports (*Overscheduled, High pressure*)

Counseling vs. Cognitive Behavioral Therapy:

CBT works in 30%-60% of Migraineurs. It is an evidenced-based, well-defined, outcome-driven series of sessions teaching techniques that modify the way child manages both triggers and pain itself.

- Progressive relaxation
- Biofeedback
- Guided imagery
- Deep breathing
- Behavioral modifications

+ Case study: 8 yo F with headache



■ Social Hx, Stress/safety screening

- Lives locally with bio parents, younger healthy brother
- No new stress at home, discussion of divorce, domestic violence
- No past trauma, concern for abuse in or outside of the home
- No exposure to alcohol/drug/tobacco
- No bullying but academics is a struggle. Does well socially.
- Many simultaneous extracurricular activities including competitive diving, swim team, ballet, soccer, gymnastics and guitar



Case study: 8 yo F with headache

Question 5

- Based on this child's history, what support can we provide to mitigate stress and support headache treatment?
 - A. Ask the parent to investigate school counselor options
 - B. Provide a simple 504 plan for school to decrease missed days.
 - C. Provide a diagnosis letter for her teacher to encourage support and prompt treatment.
 - D. Identify areas where child may need better balance in school vs. activities.
 - E. All of the above



+ Case study: 8 yo F with headache

Final recommendations

6. Stress
 - 504 plan for school treatment and support of headache.
 - Decrease extracurricular commitments to allow for more down time and an earlier bedtime.
 - We introduced the idea of Cognitive Behavioral therapy and counseling resources if headaches did not respond to lifestyle measures.
 - Referred to Neuro-psychologist (as mentioned prev)

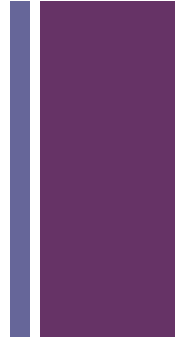
+ Case study: 8 yo F

“Lexi’s” follow up visits

- 1st visit (4/2019) (headache 4-7x week)
- 2nd visit (6/2019) (headache – 3-4x/week)
 - MRI with/without contrast – nonspecific white matter changes not considered cause for her headaches
 - Eye exam normal
 - Out of school
 - Few changes in sleep/habits or extra-curricular activities
 - Neuropsych still pending
- 3rd visit (9/2019) (frequency remains 3x/week but now some prolonged with higher severity and emesis)
 - Back in school
 - Has seen Neuropsych- +ADD/focus issues; recommended stimulant therapy; family unsure
 - Stopped caffeine, increased water
 - Continued variable/late bedtimes with poor sleep hygiene as well as issues with school not providing medication or allowing access to water
- 4th visit (12/2019) (headaches 1/week, responsive <1 hour with NSAIDs, no emesis)
 - Family started stimulant therapy 2 months prior
 - Teachers pleased with improvement in focus and work
 - Better sleep, hydration and support with medication at school



+ Summary

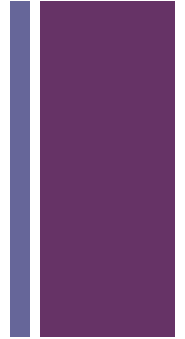


- Headaches are common among children and rarely life-threatening.
- Primary headaches are diagnosed by exclusion, however a careful history and exam can rule out most if not all secondary processes.
- Primary headaches are managed with a combination of medication, preventive measures, stress management, school support and reassurance.
- Literature supports consideration of stressors and safety screening

+ Forms/PedMAP discussion



+ References



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