"MY HEAD HURTS!"

ADDRESSING PEDIATRIC HEADACHES IN AN OPTOMETRIC EXAM

KOA Spring Conference
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FINANCIAL DISCLOSURE

- I do not have any relevant financial relationships to disclose.

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LECTURE OBJECTIVES

- Headache Definitions
- Headache and Migraine Types
- Headaches and Migraines in Children
- Addressing Headache Complaints in an Optometric Exam
- Examining Pediatric Patients with Headaches
- Example Headache Cases
- Recommendations for Imaging, Follow-Up, and Referral

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HEADACHE

Defined by the ICHD-3

Headache: pain located in the head, above the orbitomeatal line and/or nuchal ridge.

Important headache definitions:

- *Primary headache* - not caused by or attributed to another disorder
- *Secondary headache* - caused by another underlying disorder
- *Episodic* - Recurring and remitting in a regular or irregular pattern of attacks of headache (or pain) of constant or variable duration.
- *Chronic* - attacks of headache occur on more days than not over a period longer than 3 months.

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TENSION-TYPE HEADACHE

2.1 Infrequent episodic tension-type headache
2.2 Frequent episodic tension-type headache
2.3 Chronic tension-type headache
2.4 Probable tension-type headache

- Also known as a muscle contraction or stress headache
- Most common form of headache
- Lifetime prevalence 30-78%
- Typically described as a "band around the head"
- Not typically accompanied by nausea or vomiting

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TENSION-TYPE HEADACHES

- A. At least 10 episodes of headache occurring on <1 day/month on average (<12 days/year) and fulfilling criteria B-D
- B. Lasting from 30 minutes to 7 days
- C. At least two of the following four characteristics:
  - bilateral location
  - pressing or tightening (non-pulsating) quality
  - mild or moderate intensity
  - not aggravated by routine physical activity
- D. Both of the following:
  - no nausea or vomiting
  - no more than one of photophobia or phonophobia

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CLUSTER HEADACHES

- Classified by ICHD-3 as a type of **trigeminal autonomic cephalalgia (TAC)**
  - Trigeminal (CN 5) – the pain associated often localizes to face particularly around and behind the eye
  - Autonomic – symptoms like red/teary eye, runny/stuffy nose, sweating/flushing of the face, drooping eyelid, or sense of ear fullness. Occur on the same side as the pain.
- Consists of severe headaches on one side of the head
- Recurrence of headache attacks usually in a series lasting for weeks or months, separated by remission periods usually lasting months or years
- Thought to be the most painful headache type
- Most often occur between the ages of 20 and 40, more common in men

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CLUSTER HEADACHE

- A. At least five attacks fulfilling criteria B-D
- B. Severe or very severe unilateral orbital, supraorbital and/or temporal pain lasting 15-180 minutes (when untreated)[1]
- C. Either or both of the following:
  - at least one of the following symptoms or signs, ipsilateral to the headache:
    - conjunctival injection and/or lacrimation
    - nasal congestion and/or rhinorrhea
    - eyelid edema
    - forehead and facial sweating
    - miosis and/or ptosis
  - a sense of restlessness or agitation
- D. Occurring with a frequency between one every other day and 8 per day

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MIGRAINE

1.1 Migraine without aura
1.2 Migraine with aura
1.3 Chronic migraine
1.4 Complications of migraine
1.5 Probable migraine
1.6 Episodic syndromes that may be associated with migraine

- Migraine is defined as a chronic and episodic disorder characterized by headache attacks.
- Third most prevalent disorder in the world.
- Third-highest cause of disability for those under 50.
- More common in women than men.

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MIGRAINE WITHOUT AURA

- A. At least five attacks fulfilling criteria B-D
- B. Headache attacks lasting 4-72 hours (untreated or unsuccessfully treated)
- C. Headache has at least two of the following four characteristics:
  - unilateral location
  - pulsating quality
  - moderate or severe pain intensity
  - aggravation by or causing avoidance of routine physical
- D. During headache at least one of the following:
  - nausea and/or vomiting
  - photophobia and phonophobia

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MIGRAINE WITH AURA

Aura: Early symptoms of a migraine attack believed to be secondary to focal cerebral dysfunction.

- A. At least two attacks fulfilling criteria B and C
- B. One or more of the following fully reversible aura symptoms:
  - visual
  - sensory
  - speech and/or language
  - motor
  - brainstem
  - retinal
- C. At least three of the following six characteristics:
  - at least one aura symptom spreads gradually over ≥5 minutes
  - two or more aura symptoms occur in succession
  - each individual aura symptom lasts 5-60 minutes[1]
  - at least one aura symptom is unilateral[2]
  - at least one aura symptom is positive[3]
  - the aura is accompanied, or followed within 60 minutes, by headache

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MIGRAINE – PRODROME AND POSTDROME

- ***Prodrome:*** A symptomatic phase, lasting up to 48 hours, occurring before the onset of pain in migraine without aura or before the aura in migraine with aura.
  - Common symptoms: fatigue, elated or depressed mood, unusual hunger and cravings for certain foods
- ***Postdrome:*** A symptomatic phase, lasting up to 48 hours, following the resolution of pain in migraine attacks with or without aura.
  - Common symptoms: fatigue, elated or depressed mood, and cognitive difficulties

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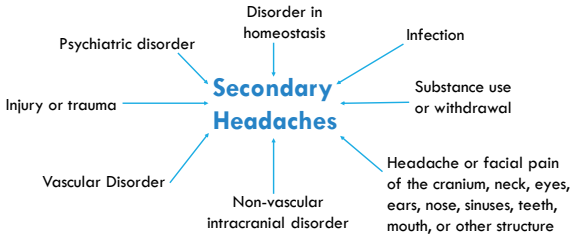
SECONDARY HEADACHES



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HEADACHES: THE RED FLAGS

- Abrupt onset
- Association with fever, coughing, straining or sexual activity
- Change with position or exertion
- Focal neurological symptoms or signs
- Onset after the fourth decade
- Onset during pregnancy or postpartum
- Papilledema
- Progressive worsening
- Underlying disorder such as cancer or HIV disease

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HEADACHES IN CHILDREN

- 20% of US children are prone to headaches.
- Up to 4% of children have their first headache before they enter grade school.

- Frequent symptoms but difficult to distinguish the headache's severity in children
- Often due to the same reasons as adults

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HEADACHE TYPES IN CHILDREN

- Tension-type headaches are the most common in children.
- Cluster headaches are rare in children.
- Vast majority of children do not have any serious underlying disease.

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MIGRAINES IN CHILDREN

- Migraines have been reported in children as young as 4 years old.
- 5% of children experiencing chronic headaches will be diagnosed with migraines.
  - 15% experience a migraine with aura
- May also have migraine variants
- Girls and boys affected at different rates
- Often inherited

Common differences in children vs. adult migraines
- Can affect both sides of the head
- Typically shorter duration and less frequent than adult migraines

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CAUSES OF HEADACHES IN CHILDREN

- Emotional Factors
- Genetic Predisposition
- Diet and Hydration
- Illness or Infection
- Head Trauma
- Vision Problems
- Organic Causes

Red flags to look for with pediatric headaches
- Altered mental status
- Abnormal eye movements
- Optic disc distortion
- Motor or sensory asymmetry
- Coordination disturbances
- Abnormal deep tendon reflexes

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HEADACHE – CHIEF COMPLAINT

Most important part of the evaluation
Important to establish whether acute or chronic

- Nature of headache
- Location of the headache
- Daily pattern of the headache
- Precipitating or alleviating factors
  - Associated symptoms (especially any neurological associations)
  - Any photophobia, phonophobia, osmophobia, and gastrointestinal symptoms?
- Family history of headaches

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HEADACHE - EXAMINATION

- Visual acuity
- Eye alignment and motility
  - Other BV and accommodative testing
- Visual Fields
- Pupils
- Refraction – manifest and/or cycloplegic
- Ocular health assessment

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HEADACHES CASES

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CASE #1

An 8-year-old male complains of frequent headaches. Mother states that he has been experiencing headaches since starting 3rd grade. Headaches occur in the forehead region, couple times a week, mainly at the end of the day, and are relieved with ibuprofen. Patient reports that he cannot see the board well.

Testing	Results
Visual Acuity sc	20/50 OD, 20/60 OS
Cover Test	Orthophoria at D and N
Refraction	-1.00-0.50x180 OD -1.25 sph OS

All preliminary and ocular health testing is WNL.

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CASE #1

Diagnosis:
- Myopia, Bilateral (H52.13)
- Headache, Unspecified (R51.9)

Treatment option(s):
Spectacle correction

Follow-up:
RTC x 2-3 months for doctor-directed follow-up on headaches with new SpecRx.

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CASE #2

A 12-year-old female complains of headaches mainly at the end of the day especially with reading. The headaches occur in the forehead region. The patient states that they have been going on for years but that they have been worse since school started a few months ago. (+) eye strain, (-) diplopia, (-) N/V or photophobia.

Testing	Results
Visual Acuity (Distance) sc	20/20 OD, OS
Visual Acuity (Near) sc	20/20 OD, OS
Cover Test sc	Orthophoria at Distance 10 Δ XP at Near
Step Vergences	BI @ near: X/14/10 BO @ near: 4/10/6
NPC	15/ 18 cm
Accommodative Amplitudes – Push Up	15 cm → 6.7 D OD, OS
MEM	+1.25 D OD, OS
Refraction	+0.25 sph OD Plano-0.50x180 OS

All preliminary and ocular health testing is WNL.

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Possible Binocular Vision Problem
BCVA: 20/20 to 20/25 Vision

Uncorrected < 20/25 → Rule Out a Refractive Error and/or Ocular Health Issue

Cover Test

No Substantial Cover Test (≤4 Δ EP or XP)

Accommodative Dysfunction
Accommodative Insufficiency
Accommodative Excess

Vertical Heterophoria

Oculomotor Dysfunction

Eso Deviation

Convergence Excess
(Eso Greater at Near)

Divergence Insufficiency
(Eso Greater at Distance)

Basic Esophoria

Exo Deviation

Convergence Insufficiency
(Exo Greater at Near)

Divergence Excess
(Exo Greater at Distance)

Basic Exophoria

Any Accommodative Issues???

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PSEUDOCONVERGENCE INSUFFICIENCY

- Patient has difficulty accommodating → underaccommodating causes the patient to underconverge
  - *Convergence Insufficiency (CI)*: XP greater at near, receded NPC, low PFV (BO) ranges
  - *Accommodative Insufficiency (AI)*: Low accom amps, high lag of accom
- Up to 89% of CI patients may also have an accommodative insufficiency.
- Emphasizes the importance of checking accommodation with a CI diagnosis

Convergence Insufficiency ★ Accommodative Insufficiency

	Testing	Expected Finding
Convergence Issues	***Cover Test***	Orthophoria at distance, 10 Δ XP at near
	NPC	15 cm/18 cm
	Vergence Amplitude	BO @ near: 4/10/6
	Vergence Facility	6 cpm (slow with BO)
Accommodation Issues	Binocular Accommodative Facility	4 cpm (fails -)
	Monocular Accommodative Facility	5 cpm OD, OS (more difficulty with -)
	NRA/PRA	+2.50/-1.50
	MEM	+1.25 D OD, OS
	Accommodative Amp – Minus to Blur/Push Up	6.7 D OD, OS 15- ¼(age) = min

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CONVERGENCE INSUFFICIENCY SYMPTOM SURVEY (CISS)

- CISS survey consists of 15 items
- Patient choses between 5 answers
  - Answers include never, infrequently, sometimes, fairly often, and always.
- Score 0 to 4 with 4 indicating the highest frequency of symptoms
- The 15 items are scored (total from 0 to 60).
  - 0 being absolutely asymptomatic, 60 being most symptomatic

Abnormal scores
- Children (9-17 years old): **16** or higher
- Adults (18+ years old): **21** or higher

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CASE #2

Treatment options:
- Reading glasses
- BI prism
- Vision therapy

Follow-up dependent on treatment

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CASE #3

A 15-year-old male presents to the clinic for an evaluation of headaches. The headaches began 4 months ago and occur almost every day in the temple area. No particular pattern. The patient complains of blurry vision and difficulty reading. Patient was recently prescribed reading glasses, but they do not help. (+) photophobia.
- Concussion in high school football game x 4 months ago, no loss of consciousness
- No significant findings on MRI following incident

Testing	Results
Visual Acuity (Distance) sc	20/20 OD, OS
Visual Acuity (Near) sc	20/20 OD, OS
Cover Test sc	Orthophoria at Distance 4 Δ XP at Near
NPC	5/7 cm
Accommodative Amplitudes – Push Up	10 D OD, OS
MEM	+0.50 D OD, OS
Manifest Refraction	Plano-0.25x030 OD -0.25 sph OS

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CASE #3 – ADDITIONAL TESTING

Testing	Results
Smooth Vergences	BI @ Near: X/20/16 BO @ Near: 25/30/20
*Vertical prism applied OD.	Supravergence @ D+N: 2/1 Infravergence @ D+N: 3/2
Maddox Rod	2 Δ R Hyper @ D and N

Compensated for the exophoria

All other preliminary and ocular health testing is WNL.

Treatment:
- Prism glasses with tint for photophobia

Follow-up
- RTC x 2 months to monitor vertical heterophoria with new SpecRx.

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TRAUMATIC BRAIN INJURY – YOUTH SPORTS

Among 100 adolescent athletes with a concussion, Master et al. (2016) found:
- Accommodative disorders (51%)
- Convergence insufficiency (49%)
- Saccadic dysfunction (29%)

TBI can greatly affect a child's ability to return to school and play.

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ACQUIRED BRAIN INJURY – VISUAL ISSUES

- Cyclovertical heterophoria
- Exo deviations - convergence insufficiency, intermittent/constant exotropia
- Vertical deviations
- Accommodative dysfunction
  - insufficiency, excess, or infacility
- Oculomotor dysfunction

Symptoms that are primarily characteristic of ABI:
- Poor balance and coordination
- Dizziness
- Light sensitivity
- Difficulty with distance activities such as watching TV, driving, sports

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CASE #4

A 10-year-old male reports for an evaluation of headaches. Headaches occur several times a week at the end of the day in the occipital region.

(-) photophobia, (+) eye strain, (-) N/V

Patient has a recent diagnosis of amblyopia OS. No history of glasses or patching.

Testing	Results
Visual Acuity sc	20/20 OD 20/80 OS
Cover Test	Orthophoria at distance 6-8 Δ ILXT at near
Stereo Acuity	(-) RDS
Wet Retinoscopy	Plano OD +0.50-0.25x180 OS

All other preliminary and ocular health testing is WNL.

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CASE #4

Assessment and Plan: Strabismic Amblyopia OS

- Begin patching OD 2-4 hours/day. RTC x 2 months for strabismic amblyopia follow-up.
- After several visits, no improvement in VA OS was measured with amblyopia treatment and reported compliance.
- Due to small angle exotropia and VA reduction, patient was referred for a MRI of the brain with and without contrast.

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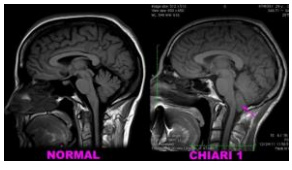
CASE #4

- MRI results revealed mild cerebellar tonsillar ectopia suggestive of a Chiari I malformation.
- The patient was referred to neurology and is now being co-managed.
- With continued patching and co-management with neurology, the patient improved to 20/25+ OS.



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CASE #5

A 16-year-old female reports for a comprehensive exam. The patient complains of light sensitivity with frequent migraines and has been previously prescribed tinted lenses to help with photophobia. The migraines are long-standing, and the patient has tried numerous medications with no success. Patient routinely sees neurology for follow-up on her migraines.

Medical History: Migraines, Polycystic Ovarian Syndrome

Testing	Results
Visual Acuity (Distance) sc	20/20 OD, OS
Visual Acuity (Near) sc	20/20 OD, OS
Cover Test sc	Orthophoria at Distance and Near
Dry Retinoscopy/ Refraction	+0.25 sph OD, OS

All other preliminary testing is WNL.

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CASE #5: OCULAR HEALTH FINDINGS

- Posterior segment examination revealed 2+ optic disc edema (papilledema) OU.
  - Obscuration of all borders, elevation of the nasal border, complete peripapillary halo.
- After neuroimaging and lumbar puncture, the patient was later diagnosed with pseudotumor cerebri (idiopathic intracranial hypertension).

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PSEUDOTUMOR CEREBRI IDIOPATHIC INTRACRANIAL HYPERTENSION

- Type of secondary headache – headache due to increased CSF pressure
- *Diagnostic Criteria per ICHD-3:* New headache or significantly worsening headache with the diagnosis of IIH and elevated CSF pressure.
  - Headaches may be accompanied by either or both pulsatile tinnitus and/or papilledema.
- Headaches occur in 57 – 87% of pediatric patients.
  - Most often involve the neck and shoulders.
  - May also be accompanied by nausea/vomiting and back or neck pain.
- Up to 18% of patients with IIH will NOT have papilledema.

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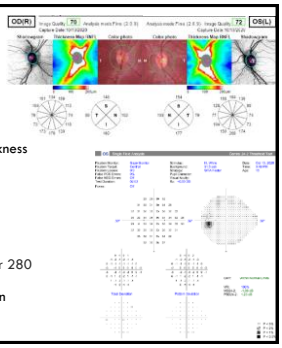
CASE #5: ADDITIONAL TESTING FOR IIH



Ophthalmological Testing

- OCT and B-scan to further assess RNFL thickness and optic nerve head volume
- Visual field testing for baseline data

Additional Testing and Treatment

- Neuroimaging (MRI or CT scan)
- Lumbar puncture - CSF exceeds 250 mm (or 280 mm for obese children)
- Medication, weight loss, surgical intervention

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CASE #6

A 12-year-old male presents for an evaluation for headaches. The patient states that the headaches gradually began 2 years ago. They occur with no pattern but seem to be worse in the past 2 months since starting school. They occur on both sides of the head and mainly at the end of the day. The patient's pediatrician is aware of the headaches, and Topamax was considered, but the patient is not taking medication at this time. (+) family history of migraines. (-) N/V or photophobia.

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CASE #6

Testing	Results
Visual Acuity (Distance) sc	20/20-1 OD 20/20-1 OS
Cover Test sc	Orthophoria at Distance and Near
NPC	TTN
Manifest Refraction	-0.25 sph OD +0.75-0.25x096 OS
Damp Refraction	+0.50 sph OD +1.25-0.50x096 OS

All other preliminary tests were normal.

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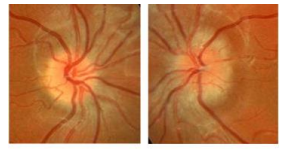
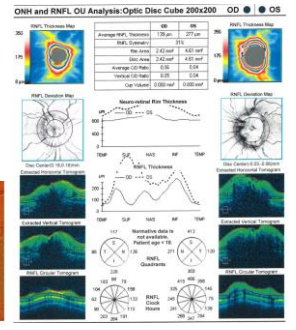
CASE #6

Optic disc edema OS>OD

Patient was scheduled for an MRI of brain and orbit with and without contrast. Findings communicated with pediatrician following MRI.





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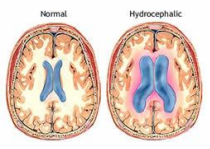
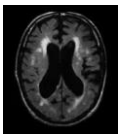
CASE #6

- **MRI Results:** Severe hydrocephalus with significant enlargement of the third and lateral ventricles.
- Patient was evaluated by pediatric neuro the following Monday and scheduled for an endoscopic third ventriculostomy 1 week later.
- Following the ventriculostomy, the patient had a shunt inserted 1 month later due to further complications.





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HYDROCEPHALUS

- Hydrocephalus is the buildup of fluid in the cavities (ventricles) within the brain.
- Can damage brain tissues and cause a range of impairments in brain function
- Can happen at any age but more common in infants and adults over 60

Early Signs	Late Signs
• Increased head circumference • Irritability • Seizures • Setting sun sign • Papilledema	• Headache • Strabismus • Nystagmus • Optic Atrophy

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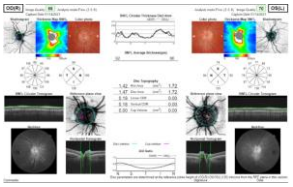
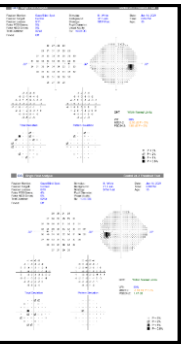
CASE #6 UPDATE



After 11 surgeries for hydrocephalus (shunts, EVDs, and revisions), MRI findings are stable and was being considered for shunt removal.



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IMAGING FOR CHILDREN

- Computed tomographic (CT) scanning or magnetic resonance imaging (MRI) is indicated in patients with a chronic-progressive headache pattern and those who have abnormal findings in the neurological examination.
- Lumbar puncture may be indicated in cases where CT or MRI are negative.
- Often bloodwork is not helpful with pediatric headaches
- Important to elicit history of trauma or migraine

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RECOMMENDATIONS - WHEN YOU DON'T FIND ANYTHING

- Headache journal
- Minimize stress
- Emphasize hydration
- Seek advice of pediatrician

Headache Journal
- Record the frequency, severity, and duration of attacks
- Keep track of treatments, outcomes, and side effects
- Identify and avoid possible triggers
- Diet and eating schedule
- Sleep schedule
- Exercise schedule
- Stress level
- Exposure to lights, sounds, or smells
- Weather
- Menstrual cycle

*Headache prognosis will largely depend on the etiology.

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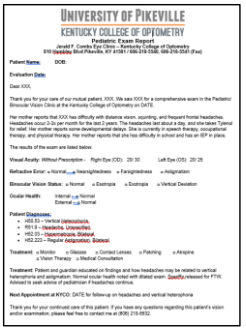
COMMUNICATION

- Communication is important to continuing care.
- Provides a future referral source
  - Simple letter addressing headache (visual origin or not?)



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PROPER DOCUMENTATION

Proper documentation should provide a(n):

- Thorough headache history
- Assessment of ocular health
- Explanation of treatment/recommendations and follow-up

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SUMMARY

- A thorough history is essential to understanding and examining a patient with headaches.
- Red flags with pediatric headaches include altered mental status, abnormal eye movements, optic disc distortion, motor or sensory asymmetry, coordination disturbances, and abnormal deep tendon reflexes.
- A comprehensive examination is essential to fully examining a patient with headaches and ruling out more serious concerns.
- If serious health or neurological concerns can be eliminated, consider further binocular vision, accommodative, and/or oculomotor testing… again, it's hard to find a BV condition unless you are looking for one.

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THANK YOU!

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