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- Dr. Weissman's passion for advancing specialist long-term care and rehabilitation for children with brain injuries has led her to sit on many regional and state Boards, including Andee's Army, Focus GA and the Brain Association of Georgia. She is the Neurosciences Quality representative for Children's Healthcare of Atlanta.
- She has pursued research and clinical interests with a focus on neuro-rehabilitation, including outcomes following brain injury and the care of children with Cerebral Palsy.

Mild Traumatic Brain Injury and Headache

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Disclosures

There are no disclosures

No industry relationships

No conflict of interest

Goals

- Identify risk factors for developing persistent headache following concussion (mild traumatic brain injury).
- Be able to distinguish different types of headache from the post traumatic headache.
- Understand what is an appropriate approach in the evaluation of the headache.
- Identify appropriate therapy strategies in treating the headache.

Headache Is Common

- Headache is a common symptom
- For individuals who experience a concussion the majority will experience headaches
- For the pediatric population - recurrent headaches occur in approximately 40% of children by 7 years of age and 75% of children by 15 years

Epidemiology

- Recurrent headaches occur in approximately 40% of children by 7 years of age and 75% of children by 15 years.
- The incidence of headache increases with age.
- A common cause of missed school and extracurricular activity.
- These data include all types of headaches.

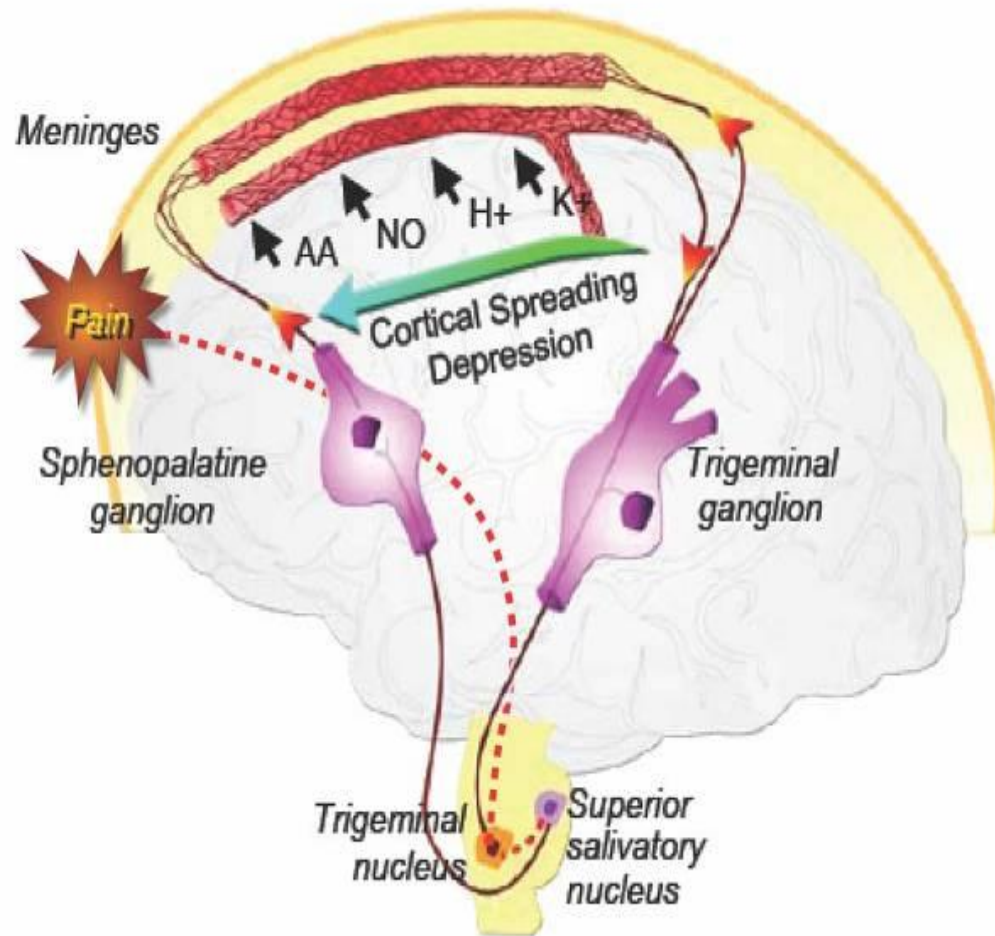
Epidemiology

- Data from the National Health Interview Survey indicates that frequent or severe headache has a prevalence of 25.3 per 1000 population for children.
- The majority of children with recurrent headache do not seek medical care.

Pathogenesis and Pathophysiology

- Pain referred to the head can arise from the following structures:
 - intracranial or extracranial arteries, large intracranial veins, or venous sinuses
 - cranial or spinal nerves
 - basal meninges
 - cranial and cervical muscles
 - extracranial structures(nasal cavity, sinuses, teeth, mucous membranes, skin, and subcutaneous tissues).

Activation of the Trigeminovascular System and Pain Generation



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

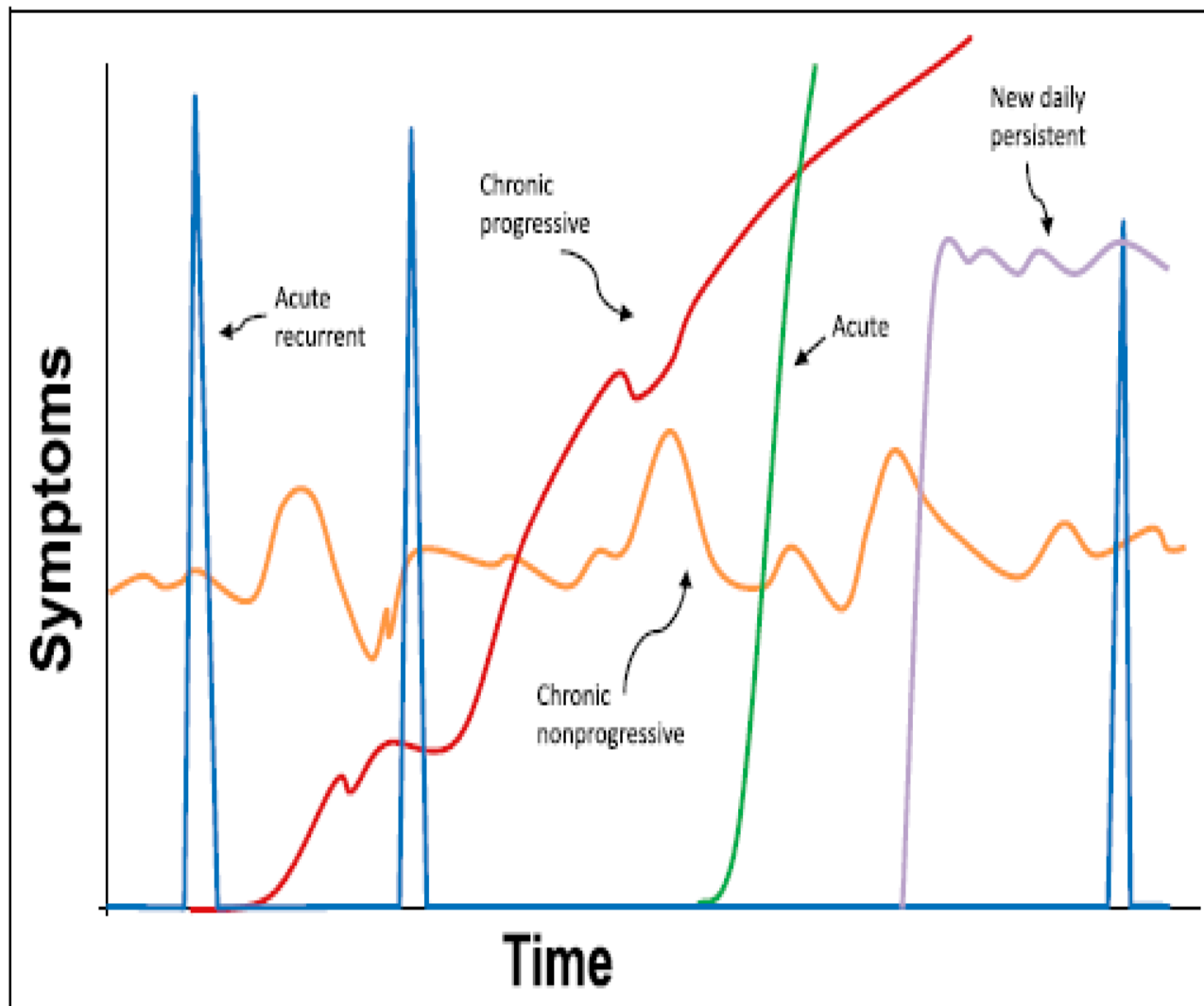


Figure. Headache patterns. (Adapted with permission from Rothner AD. The evaluation of headaches in children and adolescents. *Semin Pediatr Neurol.* 1995;2[2]:109–118.)

Specific Headaches

A person can have more than one type
of headache

Trauma

- While intracranial hemorrhage is feared with head injury, the majority have no significant structural injury.
- **PECARN** (Pediatric Emergency Care Applied Research Network) **rules** for detecting Clinically Important Traumatic Brain Injury.

Definition

- The International Classification of Headache Disorders (3rd ED) defines mild PTHA: headache that is new or significantly worse within 7 days of a mild head injury. mTBI -head injury not associated with:
 - Loss of consciousness for more than 30 min,
 - Glasgow Coma Scale (GCS) score less than 14,
 - Posttraumatic amnesia lasting more than 24 h,
 - Altered level of awareness for more than 24 h,
 - Imaging evidence of a traumatic head injury

The Child With The Worsening Headache

- Children presenting with a worsening HEADACHE have a greater risk of ICI
- Risk difference obtained from 3 Class I studies and one Class II study.
- These data supports the risk of not identifying more severe forms of TBI presenting with a progressive, severe headache in a child with or without other risk factors outweighs the risk of ionizing radiation

Imaging

- Consider Imaging – CT or MRI
- IF the Headache pain is TRULY ACCELERATING
- There are legitimate considerations for ICI
 - Require further management in accordance with decision making rules
 - PECARN RULES



Relationship between Headache & Severity of Concussion

- **No** evidence supports a relationship between headache severity post concussion in the ED and neurocognitive function during the acute period of recovery.
- **Insufficient** data exist to determine a relationship between early post concussion symptoms, including headache, and later neurocognitive outcomes or behavioral function among children with mTBI.
- There is **no** evidence to support a relationship between age and headache following mTBI.

Risk Factors for Persistent Problems Post Mild TBI

- Premorbid history of mTBI and especially if experienced persistent problems with prior mTBI
- Lower cognitive ability (a moderate risk factor)
- Neurological or psychiatric disorder (not a high risk factor)
- Learning difficulties (a moderate risk factor)
- Increased pre-injury symptoms (not a high risk factor) – may be confused with depression
- Family and social stressors (a moderate risk factor)

Age & Sex and Concussion Symptoms

- Children > age 6 years with DX of mTBI at ED – 5-10 % more likely to have a persistent headache – especially Adolescents
- Compared to Children < 6 years with DX of mTBI
- Girls more likely to have persisting symptoms than boys.



Pediatric Migraine Disability Assessment (PedMIDAS) Questionnaire

Directions

- Complete questions 1 – 6 for ALL of your headaches during the last 3 months. Write 0 if you did not experience that activity in the last 3 months.
- Add up the answers to questions 1 – 6. (Do not include your answers to A and B in this total)
- Answer questions A and B.

Scoring

Grade I (0 – 10): Little or no disability

Grade II (11– 30): Mild disability

Grade III (31 – 50): Moderate disability

Grade IV (greater than 50): Severe disability

- 1. How many full school days of school were missed in the last 3 months due to headache?
- 2. How many partial days of school were missed in the last 3 months due to headache? (Do not include days you counted in question 1 where you missed work or school).
- 3. How many days in the last 3 months did you function at less than half your ability in school because of headache? (Do not include days counted in the first two questions).
- 4. How many days were you not able to do things at home (i.e. chores, homework, etc.) due to a headache?
- 5. How many days did you not participate in other activities due to headache (i.e. play, go out, sports, etc.)?
- 6. How many days did you participate in these activities but function at less than ½ your ability?



Chronic Headache

- Likely multifactorial following mTBI
- Need multidisciplinary evaluation to obtain a depth of information about the child/adolescent
- Obtain a history about Analgesic use to consider overuse
 - Medication overuse Headache
 - Headache occurring on ≥ 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



Important Considerations For Mild TBI Headaches

- Other conditions may cause headaches
- New symptoms or other worsening symptoms occurring after the mtbi
- New changes in mental status

Sleep and Headache

Bruni et al., *Cephalalgia* 17:492-8, 1997

- 283 Headache children and adolescents
- 893 Normal children
- Migraine children: higher incidence of infant sleep problems and 3 month colic
- Higher co-sleeping, disturbed sleep, nocturnal awakenings, daytime sleepiness

Sleep and Headache

Bruni et al., *Cephalalgia* 17:492-8, 1997

- Headache children have more sleep problems
- Families have more variable sleep habits
- Did not have a treatment phase to see if improved sleep habits will improve headaches

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

Clinical Evaluation

- **Detailed clinical history, family history, and review of systems**
- **The headache history**
 1. Type of headache
 2. Aura or premonitory symptoms
 3. Age at onset and subsequent course
 4. Frequency, intensity, and duration in the past month
 5. Seasonality/school-related
 6. Exacerbating and ameliorating factors

Clinical Evaluation

7. School missed/limitation of activities
8. Medication/other treatment efficacy
9. Spontaneous self-coping techniques
10. Family history of headache/role model

Clinical Evaluation

- Environmental, behavioral, and psychosocial variables may precipitate a headache.
- Headache is a symptom, not a neurologic disorder.
- The most common causes of isolated headaches in an emergency department are viral illness, sinusitis, and migraine.

Diagnostic Evaluation

- The history is the most important part of the evaluation of a child who has headaches.
- A complete description of headaches should include information of length of history, aura, frequency, localization, quality of pain, duration, time of day or days of week, course over weeks or months, associated symptoms, precipitating or aggravating factors, and effect on pain medications on the headache.

Diagnostic Evaluation

- A detailed social history is extremely important in patients who have long-standing headaches.
- Neurologic symptoms such as visual and auditory disturbances, ataxia, focal weakness, seizures, personality changes, and deterioration in school performance.

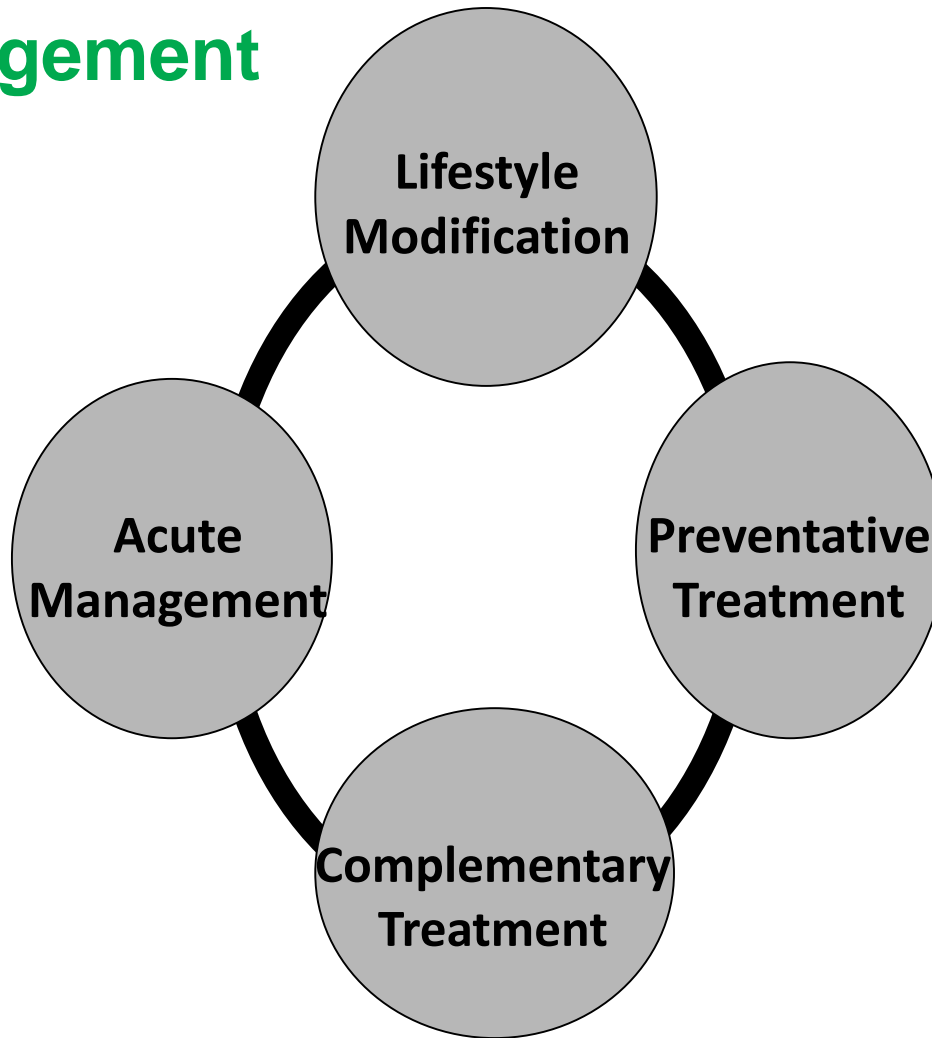
Diagnostic Evaluation

Pay attention to:

- Blood pressure
- The optic fundi
- Pericranial muscles
- Cranial bruits
- Sinuses
- Teeth
- Temporomandibular joints
- Thyroid gland
- Integument
- Neurological functioning



Management



Appropriate Therapy for Mild TBI Headache

- Painful Headache Requires some appropriate Intervention
- Non-Narcotic therapy 1st Line – Ibuprofen, Naproxen, Acetaminophen
 - AVOID OPIOIDS
- No evidence to support AVOIDING exertional activities
- Need to be AWARE of Non-narcotic Analgesic overuse
 - Risk of toxicity and rebound headache

Lifestyle Management

Sleep

Regular/sufficient sleep. 8-10 hours each night with no more than 2 hours of variability in sleep or wake timing.

Meals

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)

Activity

Regular aerobic exercise. 3 days per week for 30 minutes at a time

Relaxation

Stress reduction

Trigger Avoidance

Avoid triggers

Complementary Treatment

- Biofeedback therapy
- Relaxation techniques
- Hypnosis
- Acupuncture
- Massage Therapy

Prophylactic Agents

- Prophylactic medication should be considered only when the headaches are interfering with the child's ability to function normally, such as missing significant time from school or sports activities.

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.

Headaches

We want to see a smile on our children.