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APPROACH TO A CHILD WITH A HEADACHE

1. Background

a) Prevalence

The prevalence rate of chronic or recurrent headaches in children is 60-69% by the age of 7-9 years and 75% by the age of 15 years. Children who complain of headache are typically brought to medical attention by parents seeking reassurance that the headache is benign. While the vast majority of headaches are self-limited and benign, headaches can occasionally be life-threatening illness such as a brain tumor, hemorrhage or infection. It is thus imperative that physicians complete a thorough evaluation, including history and physical examination of any child presenting with headache.

b) Definition

- **Migraine** - An often familial symptom complex of periodic attacks of vascular headache, usually temporal and unilateral in onset, commonly associated with irritability, nausea, vomiting, constipation or diarrhea and often photophobia. Attacks are preceded by constriction of the cranial arteries, usually with resultant prodromal sensory (especially ocular) symptoms and commence with the vasodilation that follows.

c) Background Physiology

Pain can originate from inside or from outside the skull:

- Pain sensitive structures located *within the skull* include blood vessels and meninges. Any vasodilation, inflammation or displacement by traction of these structures can result in a headache.

- Pain sensitive structures located *outside the skull* include scalp arteries, muscles and nerves:
  - **Arteries** (present in high density around the eyes, forehead, and temple) can release pain mediators when dilated or stretched. Pain originating from the cranial circulation is referred to the front of the head via the trigeminal nerve. Pain originating from the posterior fossa is referred to the back of the head and neck via the first three cervical nerves.
  - **Muscles** (attached to the skull, such as the extensors, masseters or frontalis) can produce pain with prolonged tension.
  - **Nerves** (cervical and cranial) may produce pain when injured, inflamed, or displaced by traction.

Two major hypotheses exist for the pathogenesis of migraines:

Vascular hypothesis: Cranial vasoconstriction causes auras or focal neurological signs. These prodromic episodes are followed by painful vasodilation of cranial vasculature.

Neurogenic hypothesis: Afferent inputs to the brainstem result in a slowly spreading cortical neuronal depression. This depression is followed by painful dilation and inflammation of brain vasculature.

2. Questions to Ask

In addition to interviewing the child/adolescent as the primary source of information, it is important to gather collateral information from parents. A diary may be useful adjunct to map the quality, location, severity, timing and precipitating factors. Engaging the child through simple questions is important to get an accurate depiction of their pain.

Information Gathered	Sample Questions
Date, circumstances and onset	How and when did your headaches start? Was this a first headache? Was this the worst headache? How often do you get headache?
Character and severity of pain	Are your headaches getting worse?
Duration of attacks	Do they interfere with activities? How long do they last?
Location of pain, generalized or localized and any radiation	Where do you feel the headache pain? (point with one finger)

	Does the pain feel like pounding, squeezing, stabbing, or something else?
Seasonal variations	Is your headache worse in winter, spring or summer?
Preceding or accompany neurological and/or physical symptoms	What happens before you get a headache? Are there any warnings that you're going to get a headache?
Precipitating events	Do you see or hear anything funny before you get a headache?
Triggers	Is there anything that triggers your headache? –stress, behaviour, environment, food, chemical, drugs
What makes the headaches worse?	Bright light or noise
Measures of relief	Dark, quiet room, cold cloth
Sleep patterns	Do you sleep through the night?
Emotional profile	Have you recently started a new school? Have you recently moved to a new home?
Current and past treatments	Have your previously taken any medication or seen anyone about your headaches?
Trauma recent or remote	Have you been to the ER lately?
Preexisting medical problems (neurosurgical procedures, HIV, malignancy, collagen vascular disease, congenital heart disease, endocrine disorders, hematological disease)	Do you have any health problems?
Neurological symptoms visual and auditory changes, ataxia, focal weakness, seizures, personality changes, deterioration in school performance	Do you get nausea, vomiting, dizziness, numbness, weakness, or other symptoms at the same time?
Medication and toxin exposure	Was the medicine appropriate? Was the dosage correct? Any ingestion of foreign objects?
Family history	Does anyone in your family get headaches?

*** Note: Screen for elevated intracranial pressure by asking about the following:

- Nocturnal awakening
- Worsening by cough, micturition, or defecation
- Recurrent and localized

- Progressive increase in frequency or severity
- Known risk factor for intracranial pathology (e.g., neurocutaneous syndrome, macrocephaly, hormonal abnormalities)
- Lethargy
- Personality change
- Growth abnormalities
- Nuchal rigidity
- Focal neurologic deficit
- Persistent vomiting
- Pulsatile tinnitus

3. Diagnosis

Headaches can present in a multitude of forms that provide clues to appropriate management and thus it is important for the practitioner to have a clear understanding of the temporal pattern. There exist five temporal patterns of headache in children, differentiated by clinical criteria set forth by the International Headache Society (IHS).

1) Acute Headache:
   - Febrile illness: meningitis, encephalitis, URTI
   - Hemorrhage
   - Ventricular shunt malfunction
   - Initial episode of migraine

2) Acute Recurrent Headache:
   - Migraine with/without aura: Headaches characterized by periodic episodes of headache that are accompanied by nausea, vomiting relieved by sleep. Autonomic symptoms accompanying migraines include photophobia, phonophobia, nausea, and vomiting. (see IHS criteria I and II)
   - Tension type headaches: Headaches due to fatigue or emotional stress, which present with a throbbing quality in a band-like distribution. They are typically mild to moderate lasting 30 minutes to several days. They are not aggravated by routine physical activity nor are they accompanied by nausea and vomiting. (see IHS criteria III)
   - Cluster type headaches: These headaches are rare in children, having a greater prevalence in male adolescents. They are characterized by recurrent, unilateral peri-orbital, extreme non-throbbing deep pain radiating into the same side of the face and lasting less than 3 hours.

3) Chronic Progressive Headache:

- Brain Tumor- Late night, early morning headaches, vomiting, neurological changes include academic performance, weakness, visual, personality, papilledema, ataxia
- Pseudotumour cerebri- idiopathic increased intracranial pressure with papilledema, sometime CN VI palsy. Typically described in adolescent girls.

4) Chronic Non-Progressive (a.k.a. chronic daily headaches):
   - Post-traumatic Headaches – occur 8 weeks following a head injury and have a dizzy-like quality in children (see HIS diagnostic criteria V)
   - Features of increased ICP following post-traumatic head injury include:
     i. decreased level of consciousness
     ii. pain coming in waves
     iii. visual changes
     iv. alterations in vital signs

5) Mixed Headaches:
   - Acute recurrent headaches superimposed on chronic daily headaches.

4. Differential Diagnosis

The most important step in the diagnosis of any headache is the differentiation of dangerous versus benign causes.

Dangerous	Benign
Meningitis	Migraine
Encephalitis	Tension headaches
Hemorrhage	Sinusitis
Space occupying lesions	Non-meningeal infections
Vasculitis	Minor Trauma
Shunt Blockages	Cluster Headaches

5. Physical Examination

- General survey:
  - Appearance - child will migraine tends to look unwell, unique features of cluster
  - Vital signs (BP, RR, Pulse, Temperature)
- Measurements:

- Growth parameters (height, weight – may indicate brain pathology such as hypopituitary
- Head circumference (for evidence of elevated ICP)

❑ Inspection:

- Cervical spasm – rigidity may indicate muscle and spinal disease of the neck
- Special signs of meningitis:

  i) Brudinski's Sign: Neck flexion causes flexion of the legs
  ii) Kernig's Sign: Inability to extend the leg after it is flexed to a right angle with the axis of the trunk
- Signs of meningitis in the infant <1 year may be non-specific. Look for a bulging fontanel, irritability, lethargy, a flat affect and a poor feeding history (6).

❑ Auscultation:

- Carotids for bruits – may suggest intracranial arteriovenous malformation

❑ Palpation:

- Special attention should be paid to palpation/percussion of the cranium, jaw, neck, oral cavity, ears and sinuses

❑ Neurological examination:

- Be aware of signs of increased intracranial pressure

6. Investigations

❑ Lumbar puncture
- A spinal tap/ lumbar puncture is mandatory in a febrile patient with headache who has nuchal rigidity. Bacterial and viral meningitis can be discerned from the results. Refer to performance of a lumbar puncture for further details.

Appendix: International Headache Society (IHS) Criteria

I. IHS Criteria for the diagnosis of migraine without aura in children:

1. Five or more headache attacks that:

2. Last 2 to 48 hours (compared with a shorter duration in adults)

   - Have at least two of the following features:

     - Bilateral or unilateral (frontal/temporal) location (compared with bilateral location only in adults)
     - Pulsating quality
     - Moderate to severe intensity
     - Aggravated by routine physical activities

   - Are accompanied by at least one of the following
     - Nausea and/or vomiting
     - Photophobia and/or phonophobia (do not occur simultaneously in adults)

5. No underlying organic disease that it may be attributed to

II. <u>IHS Criteria for the diagnosis of migraine with aura in children:</u>

1. At least two attacks that:

2. Have at least 3 of the 4 following characteristics:
   - One or more fully reversible aura symptoms indicate focal cerebral cortical and/or brain stem dysfunction
   - At least one aura symptoms develops gradually over more than 4 minutes
   - No aura symptoms last more than 60 minutes
   - Headaches follow the aura with a free interval of less than 60 minutes. It usually lasts 4 to 72 hours, but may be completely absent.

3. No underlying organic disease that it may be attributed to

III. <u>IHS Criteria for the diagnosis of Chronic Tension-type headache in children:</u>

1. Average headache frequency <u>≥</u>15 days/month (180 days/year) for <u>≥</u>6 months

2. Headache has at least 2 of the following pain characteristics:
   - Pressing/tightening quality
   - Mild or moderate intensity

- Bilateral location
- No aggravation by routine physical activity
- Both of the following:
- No vomiting
- No more than one of the following nausea, photophobia, or phonophobia

3. No underlying organic disease which it may be attributed to

IV. IHS Criteria for the diagnosis of Cluster Headache:

1. At least 5 attacks fulfilling the criteria below:

2. Severe or very severe unilateral orbital, supraorbital and/or temporal pain lasting 15-180 minutes if left untreated

3. Headache is accompanied by at least 1 of the following:
    - Ipsilateral conjunctival injection and/or lacrimation
    - Ipsilateral nasal conjestion and/or rhinorrhea
    - Ispilateral eyelid oedema
    - Ipsilateral forehead and/or facial diaphoresis
    - Ipsilateral miosis and/or ptosis
    - Sense of restlessness or agitation

4. Attacks have a frequency from 1 every other day to 8/day

5. No underlying organic disease which it may be attributed to

V. IHS Criteria for the diagnosis of Post-traumatic Headache:

1. Head Trauma with at least one of the following:
    - Loss of consciousness for > 30 minutes
    - Glasgow coma scale of < 13
    - Post-traumatic amnesia > 48 hours
    - Imaging demonstrating a traumatic brain lesion

2. Headache develops within 7 days after head trauma or after regaining consciousness following head trauma.

3. Headache persists for more than three months after head trauma

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Acknowledgements
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