Headaches
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Disclosures
- Johnson & Johnson Resident Director Advisory Board
- Approaches to resident education regarding over-the-counter medications

Objectives
- By the end of this lecture, you will be able to:
  1. Recognize headache “red flags” and identify when imaging is recommended
  2. Differentiate between the most common types of headaches
  3. List several options for migraine prophylaxis
Morbidity
Approximately one-half of the adult population worldwide is affected by a headache disorder.

Pathophysiology
- Varies depending on headache
- Hyperactivity of central or peripheral neural nociceptive substrates
- Dysfunction of central pain modulatory systems
- Feed-forward activation of peripheral inflammatory or muscular contractile mechanisms

Headache Classification
- International Headache Society classification and diagnostic criteria
- Based on clinical consensus
- Most useful for classifying patients in epidemiologic studies and clinical trials
- Primary vs. Secondary headaches
International Classification of Headache Disorders, 2nd ed. (ICHD-2)

Primary Headaches
- Migraine
- Tension-type
- Cluster
- Other (cold stimulus headache)

Secondary Headaches
- Headaches caused by:
  - Trauma
  - Vascular disorders
  - Non-vascular intracranial disorder
  - Substance use/withdrawal
  - Infection
  - Psychiatric disorder
  - Headaches or face pain caused by disorder of cranium, E.N.T. or other facial and cranial issues

History - HPI
- Pain
  - Location
  - Quality
  - Length
  - Severity
- Associated symptoms
- Triggers
- Allaying symptoms
- Worsening symptoms
- "Red Flags"

History
- Bilateral mild to moderate pressure without other associated symptoms?
- Tension-type headache
- Headache associated with nausea, photophobia and phonophobia
- Migraine headache
- Brief (15-180 minutes) episodes of severe head pain with associated autonomic symptoms
- Cluster headache
Other Useful History

- Illicit drug use (cocaine/methamphetamine) - risk of intracranial bleeding or stroke
- Medication history
  - ASA, NSAID, anticoagulants, glucocorticoids - risk of intracranial bleeding
  - OCP and SSRI's - side effect can be headache
- Immune-suppressive conditions (HIV) - consider brain abscess, meningitis, CNS malignancy
- Coexisting infection in lungs/sinuses/orbital areas - CNS infection
- Response to pain relief?

Should NOT be used as the sole diagnostic indicator of the underlying etiology of acute headache [per American College of Emergency Physicians]
**Tension-Type Headache**

- Most common
- Affects more than 40% adult population worldwide
- Women slightly more than men
- Pathophysiology: Nociceptors in the pericranial myofascial tissues are likely source

**Episodic Tension-Type Headache (ICHD-2)**

**Infrequent**
- At least 10 episodes
- Fewer than one day per month
- Last 20 minutes to seven days
- At least 2 of the following features:
  - Bilateral
  - Pressure/tightening (nonpulsating) quality
  - Mild or moderate intensity
  - Not aggravated by routine physical activity
- Both:
  - No nausea/vomiting
  - Either photophobia or phonophobia

**Frequent**
- At least 10 episodes
- More than one but fewer than 15 days per month for at least three months
- Same criteria as infrequent

**Migraine Headache**

- History
- Nausea
- Photophobia
- Phonophobia
- Physical activity often exacerbates
- **POUND** mnemonic: at least four of these criteria are most likely to have migraine
  - **P** pulsatile quality
  - **O** one day duration (4 to 72 hours)
  - **U** unilateral location
  - **N** nausea/vomiting
  - **D** disabling intensity
## ICHD-2 Diagnostic Criteria for Migraine

### Without Aura
- At least five episodes
- Lasts four to 72 hours (untreated or unsuccessfully treated)
- At least two of the following:
  - Unilateral
  - Pulsating
  - Moderate to severe intensity
  - Aggravated by (or causes avoidance of) routine physical activity (walking/climbing stairs)
- At least one:
  - Nausea or vomiting
  - Photophobia and phonophobia

### With Typical Aura
- At least 2 episodes with:
  - Aura not including muscle weakness
  - Fully reversible
  - Visual symptoms
  - Sensory symptoms
  - Dysphasic speech disturbance
- Each symptom lasts at least 5 minutes but no longer than 60 minutes
- Headache begins during the aura or follows the aura within 60 minutes

## Cluster Headache Facts
- Rare
- Estimated 500,000 Americans experience them at least once in a lifetime
- Age of onset varies - 70% of patients prior to age 30
- Only 25% diagnosed correctly within one year of symptoms
- More than 40% report a delay in diagnosis of 5 years or longer
- Most common incorrect diagnoses:
  - 34% migraine
  - 21% sinusitis
  - 6% allergies
- Possible family history

## Cluster Headache Comorbidities
- Depression (24%)
- History with suicidal thoughts
- 26% in one study had attempted suicide
- Sleep apnea (4%)
- Restless legs syndrome (11%)
- Asthma (9%)
Cluster Headache History

- Brief (15-180 minutes) episodes
- Typically several in a day (up to eight)
- Severe head pain
  - Sharp
  - Pulsating
  - Pressure-like
- Retro-orbital area > temporal > upper teeth > jaw > cheek > lower teeth > neck

- Associated autonomic symptoms
  - Eyelid edema
  - Nasal congestion
  - Lacrimation
  - Forehead swelling

ICHD-2 Diagnostic Criteria for Cluster Headache

- At least five episodes
- Minimum of severe unilateral orbital, supraorbital, or temporal pain lasting 15-180 minutes if untreated
- Accompanied by at least one of the following ipsilateral autonomic symptoms:
  - Conjunctival injection or lacrimation
  - Nasal congestion or rhinorrhea
  - Eyelid edema
  - Forehead and facial sweating
  - Miosis or ptosis
  - Restlessness or agitation
- Episodes occur from one every other day to eight per day

Episodic Cluster
- At least two cluster periods
- Lasting seven to 365 days
- Separated by pain-free remissions of more than one month

Chronic Cluster
- Recur for more than one year
- No remission periods or with remission periods lasting less than one month
**Criteria for Low-Risk Headaches**

- Age younger than 30 years
- Features typical of primary headaches
- History of similar headaches
- No abnormal neurologic findings
- No concerning change in usual headache pattern
- No high-risk comorbid conditions
- No new, concerning H&P findings

**Red Flag Symptoms**

- Based on observational study and consensus reports
- Not 100% accurate
- Further work-up indicated

**Imaging**

- **Head CT**
  - Most widely used for acute head trauma
  - Available
  - Speed
  - Accuracy

- **Brain MRI**
  - More sensitive for subdural hematoma
  - Can identify smaller lesions
Diagnostic Testing

- Neuroimaging
- Signs/symptoms of dangerous headache
- Lumbar Puncture (LP)
  - Infection
  - Blood
  - Abnormal cells
  - Malignancy
  - Subarachnoid hemorrhage
  - Basilar artery aneurysm

Lumbar Puncture

Lying Position

Sitting Position

Diagnostic Algorithm

Available at:

Red Flag Signs and Symptoms Quiz

- Danger sign/symptom
- Possible Diagnosis
- Recommended Testing

*Americal College of Radiology Recommendations for Imaging

NOTE: CT head ALWAYS PRIOR to Lumbar Puncture to reduce risk of central herniation or tamponade.
“Headaches”
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First or worst headache of patient’s life
- CNS infection
- Intracranial hemorrhage
  - Neuroimaging
    - * CT head without contrast, CTA head with contrast, MRA head with or without contrast, or MRI head without contrast

Focal neurologic signs (not typical aura)
- Arteriovenous malformation
- Collagen vascular disease
- Intracranial mass lesion
  - Blood tests, Neuroimaging

Triggered by cough, exertion, or during sexual intercourse
- Mass lesion
- Subarachnoid hemorrhage
- Carotid artery dissection
  - Neuroimaging, Lumbar puncture
    - * MRI head with and without contrast, MRA head and neck, or CTA head and neck if suspect arterial dissection
Headache with change in personality, mental status, level of consciousness

CNS infection
Intracerebral bleed
Mass lesion
Blood tests, Neuroimaging, Lumbar puncture

Neck stiffness or meningismus

Meningitis
Lumbar puncture
* CT or MRI head without contrast

New onset severe headache in pregnancy or postpartum

Cortical vein/cranial sinus thrombosis
Carotid artery dissection
Pituitary apoplexy

Neuroimaging
* CT or MRI head without contrast
Older than 50 years old

- Mass lesion
- Temporal arteritis

Blood tests (ESR), Neuroimaging

* MRI: head with and without contrast (patients older than 60 with suspected temporal arteritis)

Papilledema

- Encephalitis
- Mass lesion
- Meningitis
- Pseudotumor

Neuroimaging, Lumbar puncture

Rapid onset with strenuous exercise

- Carotid artery dissection
- Intracranial bleed

Neuroimaging
Sudden onset (thunderclap) - peak intensity within minutes

- Bleeding into a mass or AV malformation
- Mass lesion (posterior fossa)
- Subarachnoid hemorrhage
  
  Neuroimaging, Lumbar puncture

Thunderclap Headache Differential Diagnoses

- Subarachnoid hemorrhage
- Ruptured aneurysm
- Hypertensive emergency
- Vertebral artery dissections
- Acute angle-closure glaucoma

Systemic illness (fever, rash)

- Arteritis
- Collagen vascular disease
- Encephalitis
- Meningitis

  Blood tests, Neuroimaging, Lumbar puncture, Skin biopsy

"Headaches"
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Tenderness over temporal artery

- Polymyalgia rheumatica
- Temporal arteritis
- Erythrocyte sedimentation rate (ESR), Temporal artery biopsy

Worsening pattern

- History of medication overuse
- Mass lesion
- Subdural hematoma
- Neuroimaging

With comorbidity

- Cancer - Metastasis
- HIV - Opportunistic infection, Tumor
- Lyme - Meningoencephalitis
- Neuroimaging, Lumbar puncture
  * MRI head with and without contrast
Physical Examination

- Vital Signs
  - Fever, elevated BP (> 180/120)
  - Infection
  - Increased intracranial pressure
- HEENT
  - Headache/TMJ
  - Ear exam
  - Sinuses
  - Contusions/lacerations
  - Intracranial hemorrhage
  - Papilledema
  - Increased intracranial pressure
- Skin
  - Rash
  - Tenderness over temporal artery
  - Polymyalgia rheumatica
  - Temporal arteritis
- Neurologic

Neurologic Physical Exam

- Abnormalities one of the best predictors of CNS pathology
- Focal deficit not attributed to migraine unless similar pattern in the past
- Aura lasts < 60 minutes
- Meningismus
- Unilateral vision loss
- Confusion

Other Headache Lingo
Chronic Daily Headache

- Headache 15 or more days per month for at least 3 months
- 3.8% patients presenting with acute headaches
- U.S. 33% more common in caucasians and women

Most common:
- Chronic migraine
- Chronic tension-type

Medication overuse:
- Stop the medication
- Consider prophylactic treatment
- Nonpharmacologic and pharmacologic treatments

Medication Overuse Headache

One of the most common causes of chronic daily headache
- Aspirin, ergots, worst offenders
- Preventive limit use to 2-3x/week
- Treat the acute offending agent
- Avoid in taper
- Headache prophylactic (eg, lithium, amitriptyline)
- Can take 3 months to revert to normal

Ottawa Subarachnoid Hemorrhage Clinical Decision Rule

- https://www.mdcalc.com/ottawa-subarachnoid-hemorrhage
- Only apply to: Alert patients ≥15 years old, new severe atraumatic headache, maximum intensity within 1 hour
- Do not use: Patients with new neurologic deficits, prior aneurysm, prior SAH, known brain tumors, chronic recurrent headaches (≥3 headaches of the same character and intensity for 14 months)

Age ≥40
- Neck pain or stiffness
- Witnessed loss of consciousness
- Onset during exertion
- Thunderclap headache (peaking pain within 1 second)
- Limited neck flexion on examination
"Choosing Wisely" Regarding Headaches

1. Don’t perform neuroimaging studies in patients with stable headaches that meet criteria for migraine.
2. Don’t perform computed tomography imaging for headache when magnetic resonance imaging is available, except in emergency settings.
3. Don’t recommend surgical deactivation of migraine trigger points ("migraine surgery") outside of a clinical trial.
4. Don’t prescribe opioid- or butalbital-containing medications as a first-line treatment for recurrent headache disorders.
5. Don’t recommend prolonged or frequent use of over-the-counter pain medications for headache.

Migraine Prophylaxis

- Consider:
  - Four or more headaches a month
  - Eight or more headache days a month
  - Debilitating headaches
  - Medication overuse
Migraine: Prophylaxis

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<tr>
<th>CAM/OTC</th>
<th>Level A (established efficacy)</th>
<th>Level B (probably effective)</th>
<th>Level U/B negative (conflicting or probably ineffective)</th>
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Migraine Treatment

- NSAIDs first-line treatment for mild to moderate migraine (level A)
- Triptans first-line treatment for moderate to severe migraine (level A)
- Dopamine antagonists, antiemetics 2nd line (level B)
- Parenteral dihydroergotamine (DHE 45), magnesium sulfate, valproate, and opioids should be reserved for refractory migraines (level B)

New Migraine Medication: Erenumab (Aimovig)

- Once-monthly injection
- Migraine prophylaxis
- Block the receptor of calcitonin-gene-related peptide, a vasodilatory neurotransmitter that accumulates during active migraine
- Reduces migraine days by one to 2.5 days per month
- Safe option for adults
- Expensive
- Reserved for patients with intolerable side effects to oral treatment or who have poor adherence to daily prevention
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**Treatment: Tension Headache**
- Non-pharmacologic
  - Behavioral
  - Physical
- Pharmacologic
  - APAP, ASA, NSAIDs, +/- caffeine, butalbital
  - Limit to 9 days/month
- Prophylaxis
  - TCAs
  - Venlafaxine, mirtazapine
  - No benzodiazepine

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**Treatment: Cluster Headaches**

**Abortive Therapy**
- Oxygen
- Triptans (SC or IN)
- Limited evidence:
  - Ergotamine
  - Lidocaine
  - Octreotide

**Prophylaxis/Chronic**
- Verapamil
- Can use steroids for bridging
- Lithium (+/- verapamil)
- Limited evidence:
  - Venlafaxine, topiramate,
  - Ergotamine, methysergide

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**Special Populations**
- Pregnancy
  - Non-pharmacologic whenever possible
  - Magnesium, Riboflavin, onabotulinum (Cat B), APAP (Cat C)
  - Avoid NSAIDs in 3rd trimester: triptans, ergots
- Children
  - Relaxation and CBT
  - Strong placebo effect
  - Weight-based NSAIDs
- Geriatrics
  - APAP
  - Try to avoid triptans, ergots, NSAIDs
Objectives

By the end of this lecture, you will be able to:
1. Recognize headache “red flags” and identify when imaging is recommended
2. Differentiate between the most common types of headaches
3. List several options for migraine prophylaxis

References


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