The Headache Conundrum: A Panel of Pearls for Providers

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Get to the “Heart” of the Matter

- H = History (most important)
- E = Examination (both physical & ocular)
- A = Assess the need for further testing and/or diagnose.
- R = Refer, or
- T = Treat

Headache History

PQRST
- P = Provocative & Palliative
- Q = Quality
- R = Region
- S = Severity
- T = Temporal Aspects
<table>
<thead>
<tr>
<th>Structure</th>
<th>Sensitivity to Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain parenchyma</td>
<td>Non sensitive</td>
</tr>
<tr>
<td>Cranial nerves carrying pain fibers (5, 7, 9, 10)</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Arteries of circle of Willis and first few cm of their medium-sized branches</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Meninges (dura, arachnoid, and pia mater)</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Large veins in brain and dura</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Arteries of dura near vessels</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Other parts of dura, arachnoid, and pia mater</td>
<td>Non sensitive</td>
</tr>
<tr>
<td>Structures external to skull: external carotid artery and branches, scalp and neck muscles, skin and subcutaneous nerves, cervical nerves and roots, muscles of face, and teeth</td>
<td>Sensitive</td>
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<table>
<thead>
<tr>
<th>Disease</th>
<th>Mechanism of Headache Production</th>
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<tbody>
<tr>
<td>Intracranial mass lesions such as brain tumors, hydrocephalus</td>
<td>Displacement (traction) of pain-sensitive vessels</td>
</tr>
<tr>
<td>Low intracranial pressure states such as syringobulbia, syringomyelia, and pseudotumor cerebri</td>
<td>Traction through brain shifting on dural attachments, increased intracranial pressure</td>
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<tr>
<td>Meningeal, subarachnoid hemorrhage</td>
<td>Inflammation of leptomeninges and of subarachnoid space</td>
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<tr>
<td>Temporal arteritis, arteriovenous fistulas</td>
<td>Inflammation of scalp and cranial vessels</td>
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<table>
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<td>Migraine</td>
<td>Neurovascular dysfunction and inflammation of intracranial and extracranial vessels</td>
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<tr>
<td>Cluster headache</td>
<td>Neurovascular dysfunction and ischemia of terminal cerebral vessels</td>
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</table>
| Tension-type headache | (pressure or compression)
MIGRAINE TREATMENT
Nonpharmacologic

1. Eliminate trigger factors
2. Stress management
3. Biofeedback
4. Acupuncture

Physical Techniques

- Massage, three 15-minute/week: 25% < HA
- Acupuncture + OTC painkillers: 44% < HA
- Trigger point injections
- Muscle stretching exercises
- Osteopathic manipulation
- Chiropractic spinal adjustment

Trigeminal Nerve Stimulation

- Cefaly
- Abortive & preventive therapy in episodic migraine
- Electrical impulses through an electrode patch to stimulate the supraorbital nerve
- 20 minutes a day, 18 years or older
- Three programs:
  - Treatment – blocks flow of pain
  - Prevention – increases endorphins in CNS
  - Anti-stress – general relaxation
Vagus Nerve Stimulation
- gammaCore
- Acute treatment for episodic & chronic migraines
- Preventive treatment of cluster headache
- Hand-held device applied to the neck

Transcutaneous Magnetic Stimulation
- sTMS mini
- Abortive & preventive treatment of migraine
- Applies magnetic impulse to cerebral cortex
- Central neuromodulation

Naturopathic
- Feverfew – herb, 50-100 mg daily, (parthenolide)
  Can cause oral ulcers, tongue irritation, lip swelling
- Riboflavin – Vitamin B2 – 400 mg daily: 60% < HA
  Increases energy efficiency of mitochondria
  Decreases brain sensitivity to HA triggers
- Vitamin B Complex: 50% < HA
  B6 25 mg, B12 400 mcg, folic acid 2 mg
- Coenzyme Q10 – 100 mg TID X 3 months: 50% < HA
  Improves mitochondrial dysfunction
- Magnesium 600 mg daily: 50% < HA
  Start with 200 mg daily, slowly increase to 600 mg
Botulinum Toxin Injection

- Peripheral effect – muscle relaxant
- Central effect – inhibits release of trigeminal cell-mediated neurotransmitters

Acute Treatment of Migraine

- More effective if given early
- Large single dose works better than repetitive small doses
- Oral agents may be ineffective because of poor absorption secondary to migraine-induced gastric stasis
- Non-oral route if significant nausea/vomiting
- Medication overuse if headaches are frequent

Acute (Abortive) Therapies

- Simple & combination analgesics
- Non-steroidal anti-inflammatory drugs
- Steroids
- Ergots
- Selective serotonin receptor agonists (Triptans)
Selective Serotonin Receptor Agonists

- Imitrex (sumatriptan)
- “Specific” therapy for acute migraine
  - release of vasoactive peptides
  - promote vasoconstriction
  - block pain pathways in the brainstem
  - decrease transmission of trigeminovascular sensory fibers inhibiting neurogenic inflammation

Selective Serotonin Receptor Agonists

- Efficacy: if first triptan does not work, try another – may require trial and error
- Onset: subcutaneous injection – 10-15 minutes
  - intranasal spray – 15 minutes
  - sublingual troche – no faster than oral tablets
- Route: nasal spray or injection for N/V
- Duration: longest acting – Frova and Amerge

Selective Serotonin Receptor Agonists

- Avoid in the following patients
  - familial hemiplegic migraine
  - basilar migraine
  - ischemic stroke
  - ischemic heart disease
  - Prinzmetal’s angina
  - uncontrollable hypertension
  - pregnancy
Prophylactic (Preventive) Therapy

- **Indications**
  - recurring migraines that interfere with daily routine
  - contraindication to or failure of acute therapy
  - overuse of acute therapies
  - adverse events with acute therapies
  - patient preference

- **General Rules**
  - start with low dose, gradually build-up
  - minimum 6 to 8 weeks before considered ineffective
  - continue 6 to 12 months before withdrawing
  - if headache recurs, restart drug
  - two or more withdrawal failures, continue indefinitely

- **Antihypertensives**
  - Beta blockers
  - Calcium channel blockers

- **Antidepressants**
  - Tricyclics
  - Monoamine oxidase inhibitors

- **Anticonvulsants**
  - Topiramate
  - Valproic acid
Prophylactic Therapy - Anticonvulsants

- **Topiramate (Topamax)**
  - 50% reduction of headache by 6 weeks
  - Adverse effects: paresthesia, weight loss
  - Acute angle closure glaucoma within one month of starting therapy. Edema and forward rotation of ciliary body – tx: atropine and prednisolone
  - Acute myopia: forward movement of iris-lens diaphragm
  - Reversible visual field defects independent of elevated intraocular pressure

Trigeminal nucleus releases Calcitonin Gene Related Peptide which starts migraine cascade

Monoclonal Antibodies targeting CGRP

- **Erenumab (Aimovig)**
- **Fremanezumab (Ajovy)**
- **Galcanezumab (Emgality)**

- Very target specific
- Low immunogenicity
- Long half life - Once a month sub-Q inj.
- Useful in refractory headache patients
- Useful in medically complicated patients – no cardiovascular effects
Sinusitis

- Incidence
  - Approx 30 million cases per year
- Sinusitis refers to inflammation of the sinus
- Once inflamed, sinuses become clogged with mucous, and are prone to microbial overgrowth

Paranasal Air Sinuses

- Function:
  - Warm and moisturize air entering the respiratory tract
  - Filtration of air
  - Voice resonance
  - Lightening of the skull

Anatomy of Paranasal Sinuses

- Cavities within facial skeleton that communicate with the nose
- Lined by ciliated respiratory epithelium
- Maxillary and ethmoid sinuses are present at birth
- Expansion of ethmoid labyrinth above orbital rim gives rise to frontal sinuses
Anatomy of Paranasal Sinuses

- Unilateral agenesis of one frontal sinus is common
  - 4% of population has complete agenesis of frontal sinus
- Sphenoid sinus is last to develop and is not mature until early 20's
- Mastoid Air Cells/Sinuses also late to develop
  - Unusual for mastoid sinus to be involved
Location Based Symptoms

- Frontal Sinusitis
  - Pain above the eyes or in a general mask-like pattern
- Ethmoid Sinusitis
  - Pain between and behind the eyes
- Maxillary Sinusitis
  - Pain in the cheeks and temples
- Sphenoidal Sinusitis
  - Occipital headaches

Acute Sinusitis

- Symptomatic sinus infection or inflammation lasting less than 8 weeks
- Frequently follows viral infection of the upper respiratory tract
  - Rhinovirus
  - Adenovirus
  - Influenza
  - Parainfluenza
- 20% of time, bacteria recovered with above virus

Acute Sinusitis-Symptoms

- Fever
- Pain
- Periocular headache
- Obstruction of the nasal cavity
- Anosmia
- Purulent nasal discharge
Acute Sinusitis Microbiology

- *Streptococcus pneumoniae* 35%
- *Haemophilus influenzae* 25%
- Both 4%
- *Staphylococcus aureus* 5%
- *Streptococcus pyogenes* 2%
- *Moraxella catarrhalis* 2%
- Gram-negative 10-15%

Chronic Sinusitis

- Multiple etiologies
  - Allergic
  - Anatomic (deviated septum, fs, trauma)
  - Mucous abnormalities
- Persistent signs and symptoms despite continuous treatment
  - Post nasal drainage
  - Facial pain
  - Pressure within face or eyes

Chronic Sinusitis-Clinical Signs

- Thickening of the sinus mucosa on plain film and CT
- Anaerobic bacteria more common than in acute sinusitis
- Chronic presence of thickened nasal or post nasal discharge
  - Waxes and wanes
- Headache pain worse in AM
### Chronic Sinusitis Microbiology

<table>
<thead>
<tr>
<th>AEROBIC</th>
<th>ANAEROBIC</th>
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<tbody>
<tr>
<td>Streptococcus pyogenes</td>
<td>Bacteroides</td>
</tr>
<tr>
<td>Alpha-hemolytic streptococci</td>
<td>Peptococcus</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>Propionobacterium</td>
</tr>
<tr>
<td>S. pneumonia</td>
<td>Fusobacterium</td>
</tr>
<tr>
<td></td>
<td>Veillonella</td>
</tr>
<tr>
<td></td>
<td>Corynebacterium</td>
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### Clinical Examination In-Office Pearls

- Articulation of facial bones
- Sinus percussion
- Sinus transillumination

### Articulation of Facial Bones

- An assessment of the relative pain or discomfort level associated with movement of the mucosal sinus linings.
- Movement created by slight shifting of maxillary, frontal, and nasal bone articulations.
- Thumbs are placed on the vertical aspect of the maxillary bones, with the head supported posteriorly, and pressure is exerted to retroplace the maxillary bones.
Sinus Percussion

- A measure of vibratory sensation in the frontal and right and left maxillary sinuses.
- The middle or index finger of the non-dominant hand is placed over the sinus to be tested.
- The index and middle fingers of the dominant hand are used to 'tap' the finger laying across the sinus.
- A positive result is indicated by the presence of a painful, 'reflected' sensation radiating posteriorly through the tested sinus.
**Sinus Percussion**

**Sinus Transillumination**
- Easy, inexpensive way to view frontal and maxillary sinuses
- Must be performed in a completely darkened room
- Shows us what can be seen in plain film and CT imaging

**Sinus Transillumination**
- Frontal Sinus Transillumination
  - the tip of the transilluminator is placed beneath the orbital rim portion of the frontal bone and the light is directed upward toward the frontal sinus.
Frontal Sinus Transillumination

Sinus Transillumination

- Maxillary Sinus Transillumination

- the patient’s head is tilted back far enough to see the palate, and the light source is placed on the orbital portion of the maxillary bone and aimed downward.
Maxillary Sinus Transillumination

Maxillary Sinus Transillumination

Maxillary Sinus Transillumination

Antibiotics

- Antibiotics are the mainstay of treatment of acute and chronic sinusitis.
- Acute treatment: 10-14 days
- Chronic: 30 days
- Generally, sinusitis is managed with both antibiotics and decongestants (for 7 days max) and nasal sprays PRN
Antibiotics of Choice

ACUTE:
- Amoxicillin-clavulanate (Augmentin) 500/125 TID
- *EES-400 TID*
- *ECN/Sulfisoxazole (Pediazole)* 5cc BID-TID
- Trimethoprim-sulfamethoxazole (Septra DS) BID
- Cefalexin (Keflex) 500 TID

Acute and Chronic:
- *Clarithromycin (Biaxin)* 500 BID
- *Azithromycin (Zithromax)* 250 BID day one then QD X 4D

Temporal Arteritis (GCA)

- An occlusive inflammatory process causing ischemic disease.
- HA (New onset, localized, progressive) is the major feature in 90% of cases. Otherwise, patients may be vague with their symptoms.
- Age of Onset: >50 (incident increases w/ age)
- Incidence: 20 per 100,000; Prev: 200 / 100,000
- 2:1 female > male
Temporal Arteritis (GCA)

- Signs & Symptoms:
  - Superficial Temporal Artery swelling, erythema, tenderness & pulselessness.
  - Scalp tenderness, jaw claudication, & pain in the throat, neck, teeth, gums, or eye.
  - Neurologic = transient visual loss, diplopia, mental sluggishness, & rarely, stroke. (R/O AION)
  - Systemic = fever, weight loss, anorexia, malaise, myalgia (Polyarthritis Rheumatica), sweating, & chills.

Unfortunately, if they are sitting in your chair, they most likely have already experienced:

- Sudden, painless, non-progressive visual loss (count fingers) in at least one eye.
- Decreased VA => a “True” ophthalmic emergency.
Do search to see about ausultation of temporal artery with stethoscope.
rbm, 6/4/2008
AION

- + APD
- Pale, swollen disc, + / - flame hemorrhage
- Altitudinal VF defect
- Occasionally:
  - CRAO
  - VI N. Palsy

### Table: AION vs. Non-AION Arteritic

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<tr>
<th></th>
<th>AION AGE</th>
<th>NON-ARTERITIC AGE</th>
</tr>
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<tbody>
<tr>
<td>AGE</td>
<td>70 years</td>
<td>70 years</td>
</tr>
<tr>
<td>SEVERITY</td>
<td>Moderate</td>
<td>Mild to severe</td>
</tr>
<tr>
<td>PAPILLOEDema</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>ALTITUDE OF LV</td>
<td>Normal</td>
<td>Elevated</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>Prednisone</td>
<td>Prednisone</td>
</tr>
<tr>
<td>DURATION</td>
<td>8-10 weeks</td>
<td>2-6 months</td>
</tr>
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<td>IOP</td>
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<tr>
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Sequelae of GCA
Temporal Arteritis (Dx)

- Lab Tests:
  - CBC w/ Differential
  - Anemia
  - Elevated platelet count
  - ESR (Westergren) (90-99%)
    - Men (age / 2)
    - Women (age + 10 / 2)
    - >40 is suspicious
  - C-Reactive Protein (95%)
  - Fibrinogen
  - Temporal Artery Biopsy

Procedures

- Superficial temporal artery biopsy (TAB) shows focal granulomatous arteritis, often with giant cells with skip areas within normal arterial walls.

Histopathology

- Reveals inflammatory infiltrate surrounding a fragmented internal elastic lamina within the media of an arterial wall.
- Infiltrate consists predominantly of mononuclear cells with giant cell formation.
- Mechanism is believed to be related to dysfunction of cellular immunity, but etiology is unknown.
What is the normal range for Fibrinogen?
Look-up Color Duplex Ultrasonography of Temporal Arteries.
rbm, 6/4/2008
False Negatives

- Not all patients with GCA will have abnormal labs. 15-30% with + TAB have a normal ESR.
- TAB has a false negative rate (Skip lesions) of 5-9%.

The American College of Rheumatology
5 point scoring system

- Age more than 50 years.
- A Westergren ESR greater than 50.
- Temporal artery tenderness or abnormality on exam.
- New onset headache.
- Positive temporal artery biopsy

Treatment

- First-line acute therapy without visual signs / symptoms => oral prednisone 40-60mg of prednisone ~or~ 1-2mg/kg/day.
- In the presences of visual or neurological symptoms => 80 to 100mg/d
- Ranitidine 150mg BID PO (histamine type 2 receptor blocker) – or- Prevacid (Protein Pump Inhibitor) for GI protection.
- Fosamax Plus D = 10mg daily in the prevention of steroid induced osteoporosis
- Baby ASA (81mg) – decreases cranial ischemic complications.
Treatment

- Preferred treatment for AAION:
  - **Pulse Therapy**: 3 day course of IV Solu-medrol (Methylprednisone) induction therapy of 15mg/kg/d (about 1000mg/d)
  - 22 fold increased chance of improving visual acuity if started within the first day.
  - Less Cumulative Dose of Steroids overall compared to oral Tx.
  - May reduce remission rates.

- Prognosis is poor if treatment is initiated > 48 hours.
  - 30% of patients will continue to show a decline in vision despite aggressive steroid therapy.
  - Once the signs of clinical inflammation are suppressed and the ESR is maintained at a low level, corticosteroids may be tapered slowly.
  - No agreement exists as the length of treatment with corticosteroids for GCA.
  - It may be reasonable to maintain the patient on treatment for 2 years to lessen the chances for relapses, although relapses have been reported.

Actemra (Tocilizumab)

- Interleukin-6 receptor inhibitor
- 162 mg subcutaneous injection weekly (auto-injector available)
- Used with oral prednisone
- Can taper prednisone sooner without recurrence
- Taper steroid by 6 months, continue Actemra up to 52 weeks
- Monitored by rheumatologist/neuro-ophtalmologist
- Neutropenia, thrombocytopenia, increased liver enzymes, increased lipid levels – baseline & monitor labs every 3 months

The Headache Conundrum: A Panel of Pearls for Providers

- Thank You for Your Attention!

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