The Headache Conundrum: A Panel of Pearls for Providers

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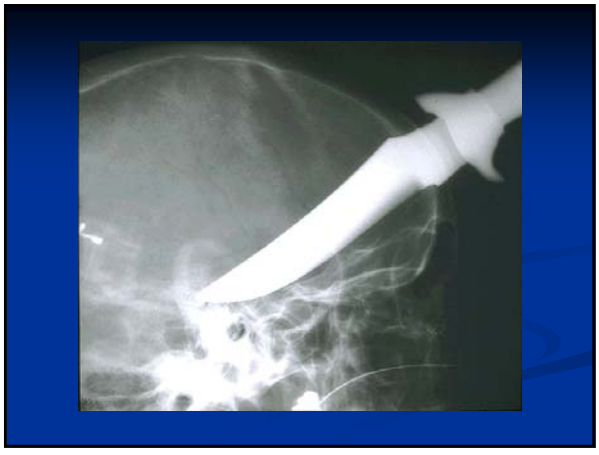


Get to the "Heart" of the Matter

- 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

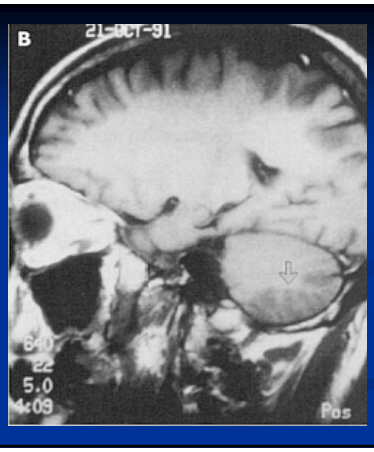
PQRST

P = Provocative & Palliative
Q = Quality
R = Region
S = Severity
T = Temporal Aspects

Structure	Sensitivity to Pain
Brain parenchyma	Not sensitive
Cranial nerves carrying pain fibers (5,7,9,10)	Sensitive
Arteries of circle of Willis and first few cm of their medium-sized branches	Sensitive
Meningeal (dural) arteries	Sensitive
Large veins in brain and dura	Sensitive
Portions of dura near vessels	Sensitive
Most other parts of dura, arachnoidea, and ependyma	Not sensitive
Structures external to skull: external carotid artery and branches, scalp and neck muscles, skin and cutaneous nerves, cervical nerves and roots, mucosa of sinuses, and teeth	Sensitive

Table 3.2 How and Why Headache Syndromes Occur

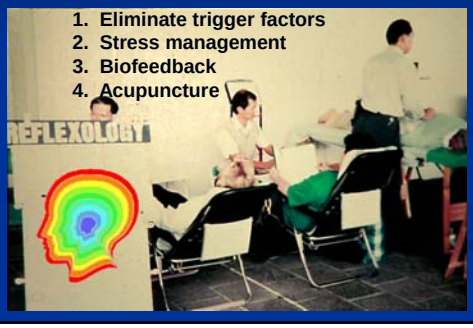
Diseases	Mechanism of Headache Production
Intracranial mass lesions such as brain tumor, hydrocephalus	Displacement (traction) of pain-sensitive vessels
Low intracranial pressure states such as postlumbar puncture headaches	Traction through brain sagging on dural attachments; intracranial vasodilatation
Meningitis, subarachnoid hemorrhage	Inflammation of vessels in meninges and of perivascular dura
Temporal arteritis, intracranial vasculitis	Inflammation of scalp and intracranial vessels
Dysfunctions	
Migraine	Neurally induced dilatation and inflammation of intracranial and extracranial vessels
Cluster headache	Neurally induced inflammation and edema of internal carotid artery
Tension-type headache	Unknown; may be increased sensitivity of pain-mediating systems in brain



MIGRAINE TREATMENT

Nonpharmacologic

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

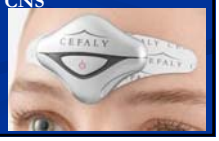


Physical Techniques

- 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

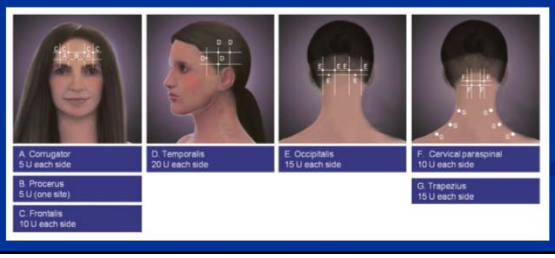
- sTMS mini
- Abortive & preventive treatment of migraine
- Applies magnetic impulse to cerebral cortex
- Central neuromodulation

Naturopathic

- Feverfew – herb, 50-100 mg daily, (parthenolide)
  Can cause oral ulcers, tongue irritation, lip swelling
- Riboflavin – Vitamin B_2 – 400 mg daily: 60% <HA
  Increases energy efficiency of mitochondria
  Decreases brain sensitivity to HA triggers
- Vitamin B Complex: 50% < HA
  B_6 25 mg, B_{12} 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 Adverse Effects

- 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

Prophylactic (Preventive) Therapy

- 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

Prophylactic (Preventative) Therapy

- 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

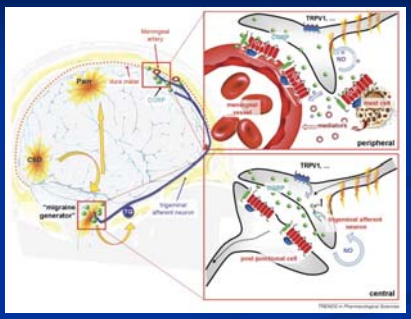
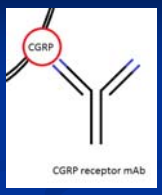


Image: CGRP antagonists: unravelling the role of CGRP in migraine. Doods *et al.* 2007

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 inflammed, 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

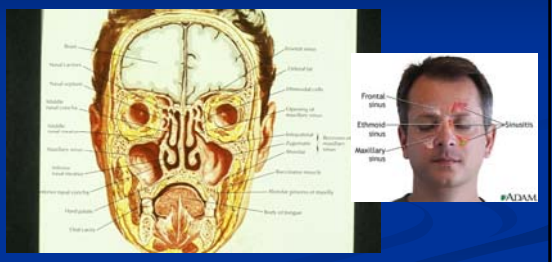
Anatomy of Paranasal Sinuses

- 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 labrynth above orbital rim gives rise to frontal sinuses

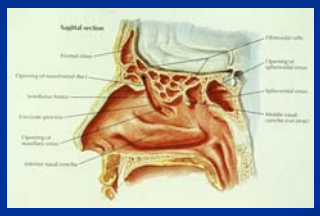
Anatomy of Paranasal Sinuses

- 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

Anatomy of Paranasal Sinuses



Anatomy of Paranasal Sinuses



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 8%
- Staphylococcus aureus 5%
- Streptococcus pyogenes 2%
- Moraxella catarrhalis 2%
- Gram-negative 10-15%

Chronic Sinusitis

- Multiple etiologies
  - Allergic
  - Anatomic (deviated septum, fx, 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

- AEROBIC
  - Streptococcus pyogenes
  - alpha-hemolytic streptococci
  - Staphylococcus
  - S.pneumoniae
- ANAEROBIC
  - Bacteriodes
  - Peptococcus
  - Propionobacterium
  - Fusobacterium
  - Veilonella
  - Corynebacterium

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 Percussion

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.

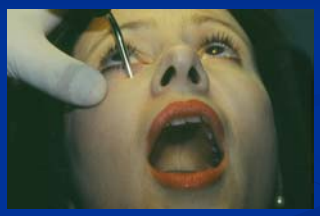
Frontal Sinus Transillumination

Frontal Sinus Transillumination

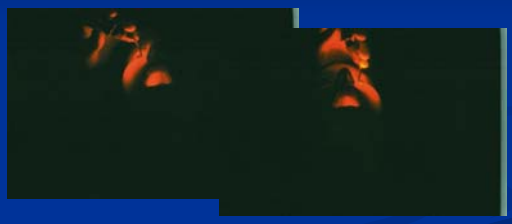
Sinus Transillumination

- 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

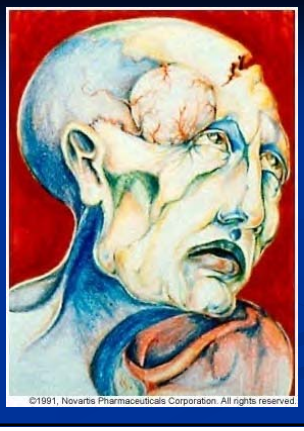


Antibiotics

- 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
  - Cephalexin (Keflex) 500 TID
- Acute and Chronic:
  - *Clarithromycin (Biaxin) *500 BID
  - *Azithromycin (Zithromax)* 250BID 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.

Temporal Arteritis (GCA)

- Signs & Symptoms:
  -
  -
  - Neurologic = transient visual loss, diplopia, mental sluggishness, & rarely, stroke. (R/O AION)
  - Systemic = fever, weight loss, anorexia, malaise, myalgias (Polymyalgia Rheumatica), sweating, & chills.

Temporal Arteritis (GCA)

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.

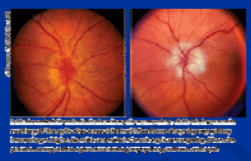
- Decreased VA => *a "True" ophthalmic emergency.*

Slide 58

r3 Do search to see about ausultation of temporal artery with stethoscope.
rbm, 6/4/2008

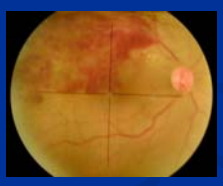
AION

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



	ARTERITIC AION	NON ARTERITIC AION
MEAN AGE	70 years	60 years
GENDER	Female > male	No relation
ASSOCIATED SYMPTOMS	Headache, scalp tenderness, jaw claudication	Occasional orbital pain
VISUAL ACUITY	<6/60 in 76%	>6/60 in 61%
OPTIC DISC APPEARANCE	Pale more than hyperemic edema Normal to large cup	Hyperemic more than pale edema Small cup
ESR	>70 (highly raised)	20-40 (mildly raised)
FFA	Choroidal (> 30 – 69 s) and disc filling delay	Disc filling delay
NATURAL HISTORY	Poor prognosis for recovery Fellow eye involved in upto 95%	Upto 3 line improvement in about 43% cases Fellow eye involved in <30% cases
TREATMENT	Urgent administration of corticosteroids	Doubtful role of corticosteroids

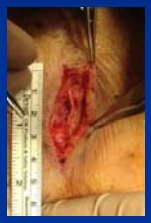
Sequelae of GCA



Temporal Arteritis (Dx)

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

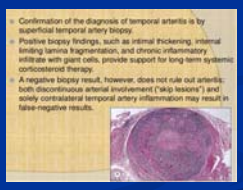
- Reveals inflammatory infiltrate surrounding a fragmented internal elastic lamina within the media of an arterial wall.
- Infiltrate consists predominantly of mononuclear cells with giant cell formation.
- Mechanism is believed to be related to dysfunction of cellular immunity, but etiology is unknown.

Slide 64

r4 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 (Methylpredisone) 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.

Treatment

- 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.

Treatment

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-ophthalmologist
- Neutropenia, thrombocytopenia, increased liver enzymes, increased lipid levels – baseline & monitor labs every 3 months

N Engl J Med 377: 317, 2017

The Headache Conundrum: A Panel of Pearls for Providers

- Thank You for Your Attention!

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