Headaches: Applications for Optometric Practices

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Headaches

- “Most common complaint of civilized man”
- 1 out of 3 people has had a severe headache
- Many HA’s felt around the eyes
- HA’s of ocular origin are relatively uncommon

Extracranial Pain Sensitive Structures

1. Skin
2. Fascia
3. Subcutaneous Fat
4. Head and neck muscles
5. Arteries and veins

Intracranial Pain Sensitive Structures

- Parts of dura at base of skull
- Dural and cerebral arteries at base of brain
- Cranial nerves V, VII, IX, XII
- The brain itself does not feel pain

Evaluation of Patient

- HISTORY!
- 95% have normal physical exam
- FODLAR
  - Sharp, stabbing, pounding, throbbing?
- Is the patient a “headachy” person?
- Is there a family history of headaches?
- Are there associated auras or other neurological symptoms?

Cranial nerve testing

- I Olfactory: Test smell in each nostril with stimuli such as cinnamon
- II Optic: Test each eye VA, VF, pupils
- III,IV,VI: Oculomotor, Trochlear, Abducens. Test EOM's
- V Trigeminal: light touch in each division, corneal reflex
- VII Facial: raise eyebrows, frown, smile, puff out cheeks, close eyes tightly

Cranial nerve testing

- VIII Vestibulocochlear: whisper number in each ear, consider balance tests and tuning forks
- IX, X Glossopharyngeal, Vagus: gag response
- Palatal sound “ka” and guttural sound “go”
- XI Accessory: shrug shoulders, turn head side to side
- XII Hypoglossal: inspect for tongue atrophy or asymmetry

Characteristics

When to become concerned:

- New HA in a pt. over the age of 50
- HA increasing in frequency or severity
- HA wakes up pt. from sleep
- Onset of HA assoc with an underlying medical condition or systemic illness?
  - HA w/ fever (spinal meningitis)
  - HA w/coughing or straining (brain swelling)
- HA w/ neurological symptoms

Classifications: ICHD III: the Internat. HA Clarification Soc.

- International Classification of Headache Disorders; third edition (ICHD III): beta (2013)
- “Beta” until ICD-11 comes out
- ICHD-II has been used since 2004
- New “Cephalgia 2018”

Primary Headaches (4 categories)

- Migraine
- Tension Type Headache (TTH)
- Trigeminal autonomic cephalgias (Cluster headaches for example)
- Others

Secondary Headaches

- Trauma induced
- Cranial or cervical vascular disorder
- Non-vascular intracranial disorder
- Due to substance or withdrawl
- Due to infection
- Due to homeostasis disorder
- Due to psychiatric disorder

Secondary Headaches

- Headache or facial pain due to disorder of the cranium, neck, eyes, ears, nose, sinuses, teeth, mouth or other facial / cervical structure

- Separate Part 3 of painful cranial neuropathies

Migraines

- ~One in 6 women suffer migraines, 1 in 20 men
- Most prevalent age 25-55 but any age possible
- Female > male 3 to 1
  - Before onset of menstruation (males = females)
  - Recent study of 50 retired NFL players (average of 8.5 years in the league), 92% had migraines (4% before)
- 80% have family history; definite genetic predisposition: Obesity = 81% higher incidence
- History of childhood car sickness, benign vertigo
- History of condition goes back thousands of years

Migraine Characteristics

- Lowest prevalence in middle income groups
- Strong correlation with depression
- Half of all adults that get them experience first episode by age 20; peaks around age 45
- Spontaneous remission in older adults is common; thought to be due to hardening of the arteries or hitting menopause
- 20% of migrainuers experience HA attack under the age of 5
- Infantile colic = 6.6 times risk for childhood migraine

Migraine and CV disease

- Within one year of migraine diagnosis…….
- 8 X risk of stroke
- 2 X risk of MI, Atrial fibulation or flutter, and VTE (venous thrombotic events)

Migraine and disability

- Third most common disease on earth
- 39 million in US, 1 billion world-wide
- Sixth most debilitating disease on earth
- Number 2 cause of disability world-wide

Migraine Etiology

- **Circulation Theory**:
  - Intracerebral ***constriction*** causes ***hypoxia*** leading to extracerebral ***dilation*** of arteries
  - Aura is caused by ***ischemia*** secondary to vascular spasm
  - The headache is believed to be caused by the ***vasodilation***
  - ***This theory has fallen out of favor!***

Migraine Etiology

- **Neuronal Dysfunction theory**: The brain of migraine patients has a decreased threshold for various stimuli. Problem in trigemino-vascular system.
- When exposure to these internal or external stimuli occurs, there is “spread” of cortical depression: “cortical hyper excitability”
- This in turn affects the vasculature which is believed to cause pain

Migraine Etiology

- Migraine brains may be constantly low on “energy”. Unstable serotonin.
- Triggers then stress the “low energy” brain leading to headaches
- Number one location for pain?.....near the Eyes! (study of 1283 pts.)

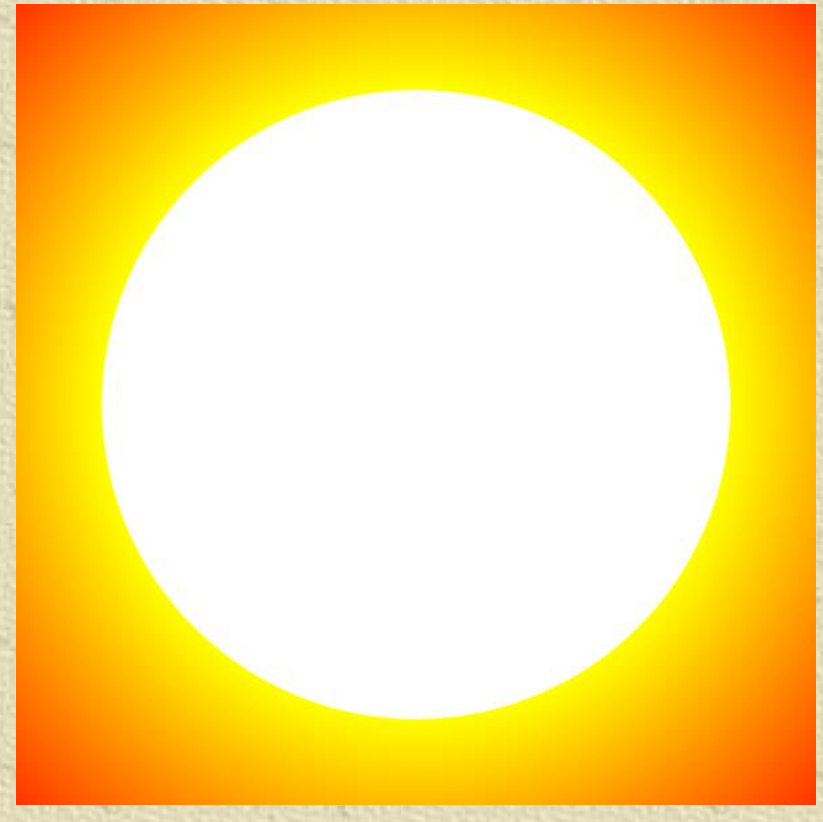
Migraine Etiology

- Genetic Predisposition
  - Threshold to triggers is determined by…….
  - 1) magnesium levels
  - 2) amino acid levels
  - 3) dopamine sensitivity
  - 4) the hypothalamus
  - 5) other factors

Triggers

- **Precipitating Factors:**
  - **Foods:**
  - **Tyramine** (bananas, avocado, yogurt, aged cheeses, pods of broad beans)
  - **Phenylethylamine** (chocolate, cheese, wine)
  - **Sodium nitrites** (food coloring, preservatives, processed meats and fish)
  - **Artificial sweeteners**
  - **Caffiene**
  - **MSG** (Chinese food, processed meats, frozen dinners, canned soup)

Triggers



- **Weather or air pressure**
- **Bright sunlight**
- **Glare**
- **Fluorescent lights**
- **Chemical fumes**
- **Menstrual cycles**—more likely during first two days of cycle

Migraine Factoid

- Patients with ocular rosacea have a 69% increased risk for migraine compared to those without it
- Perhaps there are common triggers?

Major Migraine Types in ICHD III

- Migraine without aura
- Migraine with aura
- Chronic Migraine
- Complication of migraine

- Note: rare episodic variant that mimics sinus HA almost exactly

Migraine without aura

- 70-80% of migrainuers
- May suffer from multiple sub-types at various times
- Usually unilateral but may be bilateral HA's
- Typically located in temp. or occipital region
- Children tend to experience bilateral, frontal, temporal or retro-orbital pain
- Eventually works up to severe, throbbing pain that can last 24 hrs (sometimes up to 72 hrs)

Associated Symptoms & Conditions

- Nausea and vomiting
- Photophobia and phonophobia
- Anorexia
- Improves with sleep
- Conjunctival injection and tearing
- Patient seeks dark, quiet area

Migraine with aura

- 20-30% of migraine sufferers
- Scotoma with shimmering, flickering borders or zig-zagging forms that precedes or rarely accompanies / follows the headache
- Aura is typically hemianopic and begins centrally in both eyes then spreads peripherally; leaves behind an area of impaired vision
- May last 20-60 minutes, develop over 5-20
- Extra risk of ischemic stroke, increased MI risk
- Combo type contraceptives contraindicated

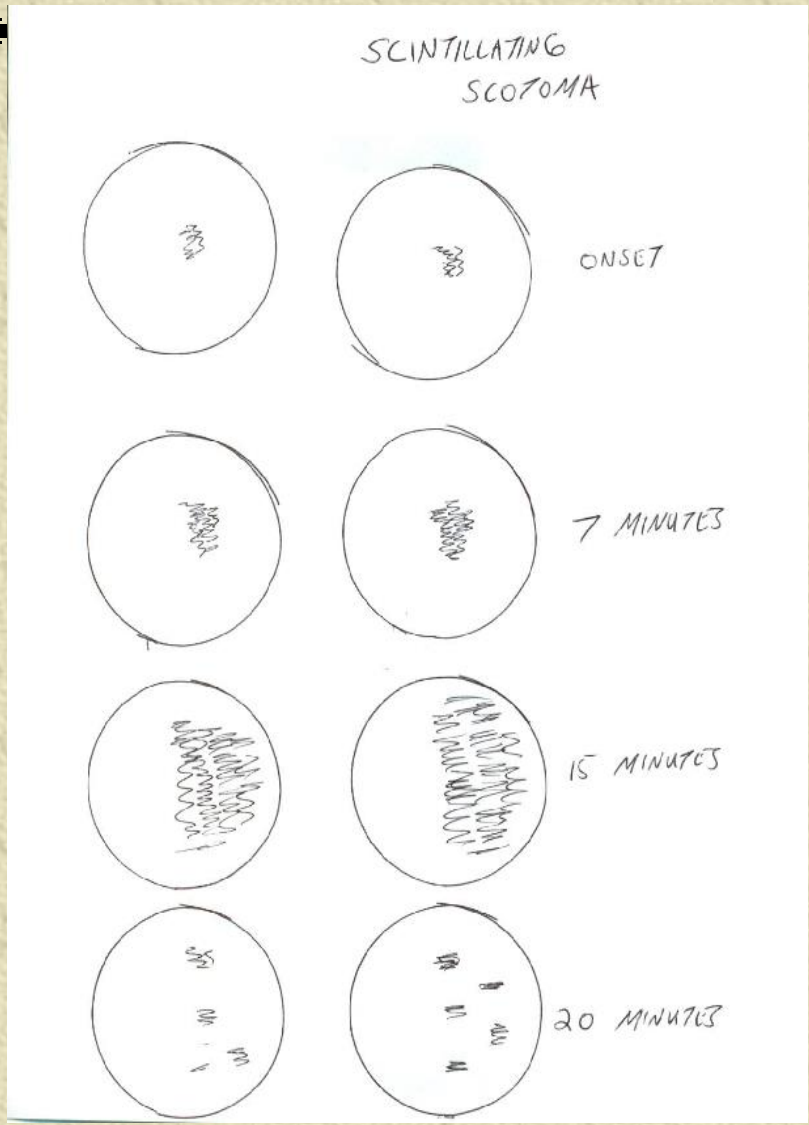
Migraine with aura

- Aura seen with eyes open or closed
- Symptoms and associations are the same as those found with migraine without aura
- Aura is an advantage for treatment purposes

Scintillating scotoma

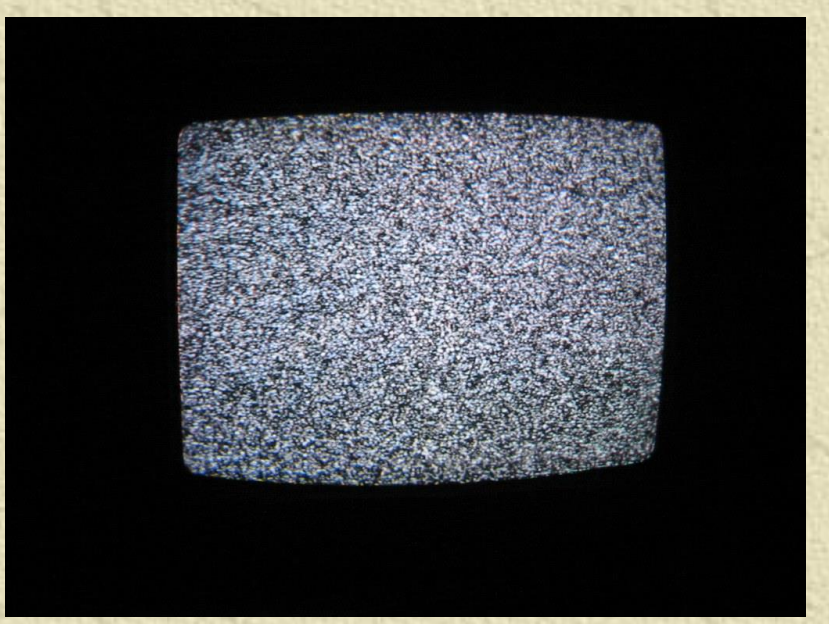
Classical migrainous scintillating scotoma with march and expansion of fortification figures.

- Initial small paracentral scotoma.
- Enlarging scotoma 7 minutes later.
- Scotoma obscuring much of central vision 15 minutes later.
- Break-up of scotoma at 20 minutes.



Visual snow syndrome

- Rare
- Found most often in migraine suffers with auras
- Constant static like snow in vision
- Likely defect in visual processing
- Very frustrating to diagnose and treat



Ocular issues with migraines

- Aura-most common cause of transient vision loss under age 45
- Hemianopsias
- Rare Horner's syndrome
- NTG
- Persistent VF defects up to weeks after an attack (no aura required)
- On rare occasions VF loss can be permanent

Prophylactic (Preventive) Treatment

- Consider if 2/month or more
- **Beta blockers**
  - Inderal, Lopresssor, Tenormin
- **Antidepressants**—
  - **Selective Serotonin Reuptake Inhibitors (SSRI's)--** Paxil, Prozac, Zoloft
  - **Tricyclics**—Amitriptyline (Elavil, Endep), Nortriptyline
  - **MAO inhibitors**-Nardil, Parnate (remember what eye drop can not be used with these)

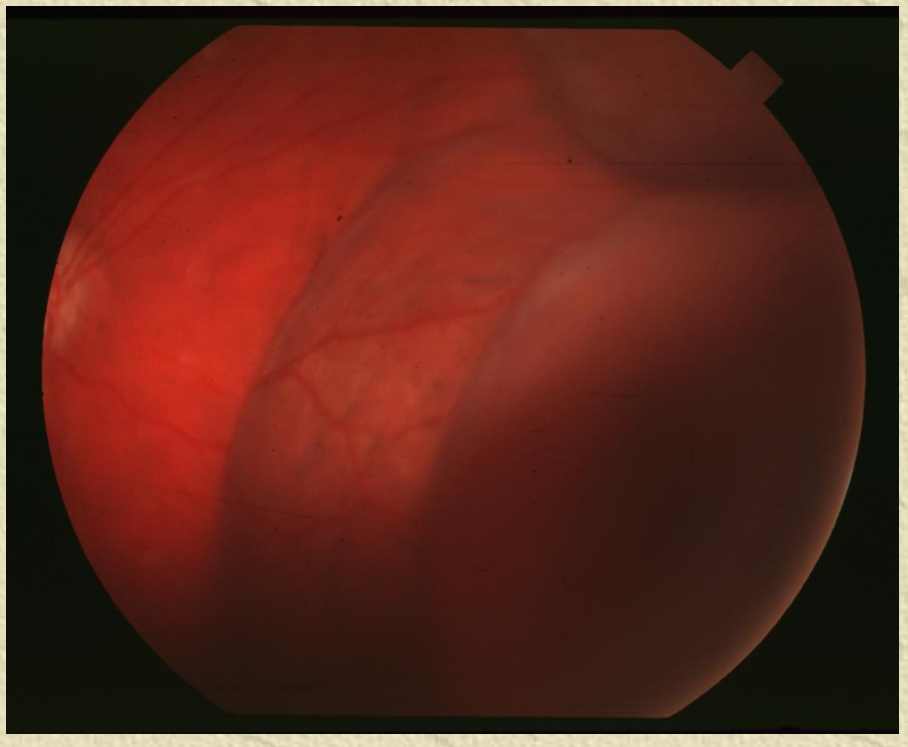
Prophylactic Treatment

- **Epilepsy medication**—(Depakote, Topamax)
  - Topamax has a FDA warning about causing angle closure
- **Lithium**
- **Calcium channel blockers** (Verapamil) to prevent intracranial vasoconstriction
  - Often don't work well
- **Botox** (botulinum toxin)—anecdotal evidence: believed to block pain receptors. Need injections every 2-3 months. Expensive!
- Combination of Simvastatin and Vitamin D

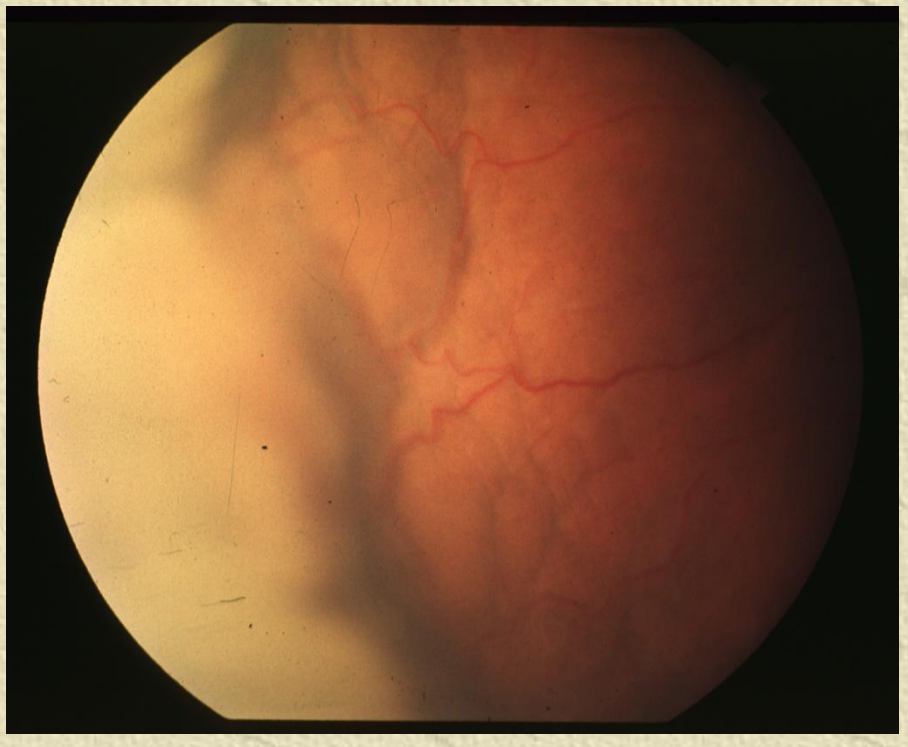
Topamax (Topirimate)

- Anticonvulsant used for migraines, epilepsy, depression, bipolar disease and weight loss
- Carries FDA warning for ocular side effects
- Several cases of acute, bilateral angle closure
- Can cause VF defects without angle closure or increased IOP

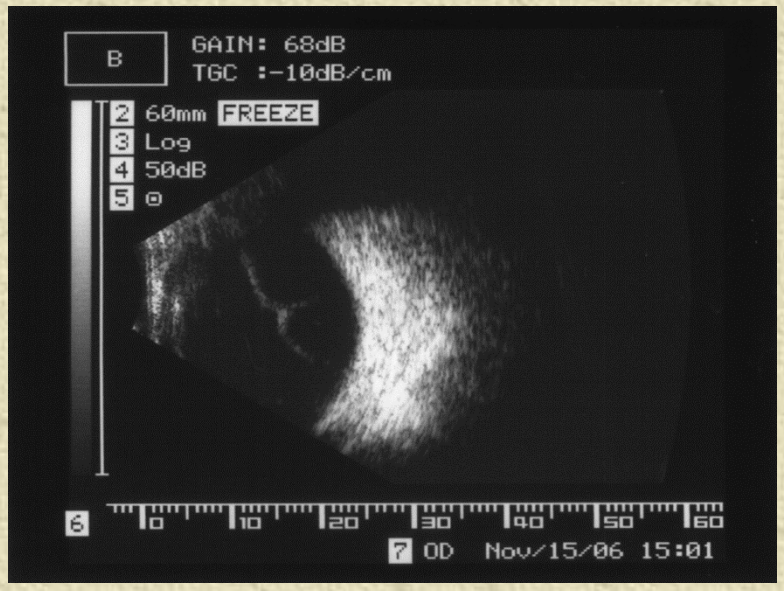
Uveal effusion



Uveal effusion



Uveal effusion B-scan



Topamax

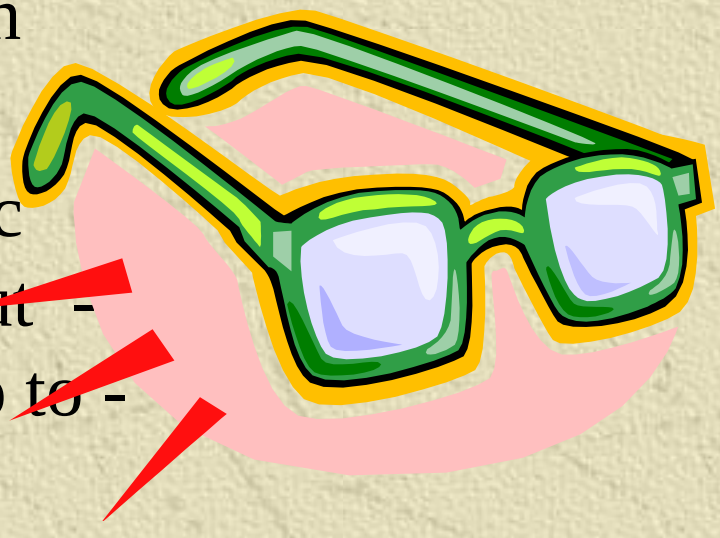
- Severe edema of the ciliary body leads to angle closure, myopic shift due to uveal effusion
- Occurs most often within 2 weeks

Topamax

- Can also happen with other sulfonamides but very rare.
- Hydrochlorothiazide
- Diamox
- Sulfasalazine
- Very rarely Wellbutrin
- LPI typically not effective
- Steroids and cycloplegics; discontinue medication

Topamax

- Also causes a 10-micron increase in RNFL thickness on average with OCT
- Can lead to myopic shifts as well, about -.50 on average. Up to -8.75 has been reported!



New class of prophylactic medication

- Calcitonin Gene-Related Peptide monoclonal antibodies
- Decrease “migraine days” by roughly 50%
- Synergistic / additive to Botox
- First entirely new class of medications to treat migraines since 1991
- Aimovig first to receive FDA approval: monthly injections, cost $575
- Several others in late stage trials

“Natural” Prophylaxis

- 400 mg riboflavin (vitamin B) daily = 60% decrease in headaches
- Butterbur root 150mg / day = 60% decrease
- Magnesium 800mg / day : must take calcium to prevent stomach upset
- Co-enzyme Q-10 300mg /day
- Medical marijuana (50% decrease)
- Possibly ketone supplements: replace glucose for energy production

Ancient attack aborting therapies……

- Blood letting
- “Cupping” : heated glass tubes applied to the skin
- Cautery of the scalp with a red hot iron
- Binding a dead mole to the skin
- Shock by electric eel, later by man made electricity.

Attack Aborting Treatment

- **Cerebral Vasoconstrictive Agents:**
- Ergot family: obtained from ergot fungus.
  - **Ergotamine tartrate** (Ergomar)- alpha adronergic antagonist--vasoconstrictor
  - **Dihydroergotoamine** (Migranal, DHE45)-
  - Topical **Beta Blocker** eye drops. More effective than oral beta blockers because they reach therapeutic levels in plasma sooner.

Attack Aborting Treatment

- **Serotonin Agonists:** Triptan family
  - Selective 5-HT receptor agonists
  - **Sumatriptan Succinate--**Imitrex (injection, tabs, nasal spray, wafer)
  - **Zolmitriptan** (zomig), **Relpax** (eletriptan), **Frovatriptan, Rizatriptan, Naratriptan** (Amerge)

Attack Aborting Treatment

- **Non-Constrictive Abortive Agents**
  - Narcotic injections
  - Stadol NS (nasal spray)—opiod analgesic
- **Antiemetic Drugs (Phenergan)**
  - Tx for nausea, dizziness, and vomiting
- **General Pain Management**
  - Narcotic analgesics—codeine, percodan, demerol, methadone, tylox
  - Non-narcotic analgesics—Midrin, Fliorinal
  - OTC analgesics may not be potent enough

Non Drug Alternatives

- **Feverfew Leaf**—thought to prevent the spasms of b.v. in head
- **Vitamin B2 and Niacin**—possibly reduce the # of migraines experienced by patients
- **Magnesium**—mixed support; consider 400mg as part of preventive tx for migraine
- **Melatonin---** can be as effective as triptans, works for more people

Non Drug Alternatives

- **Petasites hybridus** (Butterbur root)—75 mg capsule twice a day; available under the name Petadolex; used for prophylactic TX
- Biofeedback, Acupuncture, Stress management

- Note: Overuse of some migraine drugs (mostly ergotamines) can CAUSE headache

Non-drug alternatives

- Spring TMS : single pulse transcranial magnetic stimulator (attack aborting, looks a bit like a visor)
- TENS: Transcutaneous electrical nerve stimulator (worn continuously for prophylaxis)
- Green light: very specific green wavelength and filtering out all others. Ongoing research. Can decrease pain and photophobia. Can be used as prophylaxis.

Bilateral aura without headache

- “Acephalgic” term no longer in classification scheme
- Bilateral aura with no headache: may have no history of migraine
- Usually males over age 40 but onset is often before age 40
- 13% of migraine with aura patients will occasionally suffer an “acephalgic” episode

Bilateral aura without headache

- Some pts stop having migraine headaches but continue to have auras as they age
- Scintillating scotomas are the most common
- Can have other neurological signs including hemiparesis, paraesthesias, dyphasias

Bilateral aura without headache

- Origin is in the occipital region
- Bilateral event but patients often think only one eye is involved
- Scintillating scotomas, demographics, and history are the key to diagnosis
- Must r/o amaurosis fugax or TIAs from embolic source

Retinal Migraines

- Transient (or very rarely permanent) visual disturbance in ONE eye
- May last from seconds to hours but usually just several minutes
- Headache before or after the visual episode, or no headache at all

Retinal Migraine

- Believed to be due to an interruption in ciliary or retinal circulation from a vascular spasm
- Usually under age 40……except when associated with menopause
- Need to distinguish from amaurosis fugax based on patient demographics and symptoms
- Old term of “ocular migraine” no longer in classification scheme : historically referred to monocular aura without a headache

Ophthalmoplegic “Migraine”

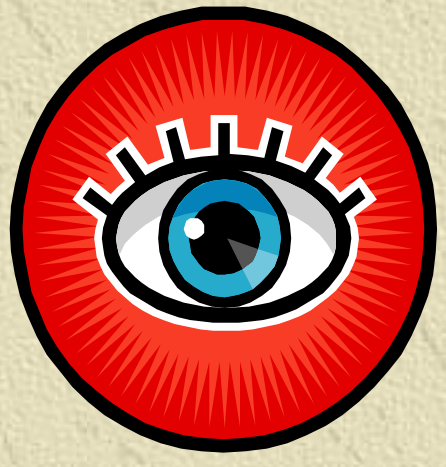
- Onset: Childhood; typically age 10 and up with history of typical migraine
- Ophthalmoplegia ipsilateral to periorbital headache
- Ophthalmoplegia can persist for days to weeks (even months)
- Affects CN III over CN VI 10:1; very rarely CN IV affected
- Permanent after years of attacks
- Older terminology

Ophthalmoplegic Headaches

- Ptosis and pupil dilation is common
- CT and MRI are normal
- R/O
  - Diabetes mellitus
  - Aneurysm
  - CNS infiltrative or infectious disease
  - Tolosa Hunt syndrome (painful ophthalmoplegia)
  - Orbital pseudotumor

Benign Episodic Pupillary Mydriasis

- Seen in women with a history of migraine
- Pupillary dilation lasting from minutes to one week, with an average of 12 hours
- Pupil may or may not react to light



Cluster Headaches (one of the trigeminal autonomic cephalgias)

- Severe, excruciating, unilateral, retro-orbital or frontal pain with no aura. “Stabbing”
- Males affected (2:1) in their 20’s - 40’s : affects .1% of population
- Nasal congestion, facial/forehead sweating
- “Projectile” lacrimation, conjunctival redness and congestion
- Personality characteristics include precise, tense, conscientious, overwrought

Cluster HA

- HA tends to cluster into several daily attacks lasting anywhere from 10 minutes-2 hours
- Some people experience them every other day
- Cluster can be a period of weeks to months, often occurring at night or early AM
- Cluster Associations:
  - **Horner's syndrome** (ptosis and miosis)
  - Horner's occurs from vasodilation of the internal carotid

Cluster HA

- Treatment:
  - Verapamil (prophylactic), Sumatriptan (for aborting)
  - Oxygen for acute cluster HA's
- Cluster Differential
  - **Raeder's syndrome**
    - Painful Horner's with pain in V1 distribution
    - Caused by neoplasm in and around the fifth nerve

Gammacore: mild electrical stimulation to the Vegus nerve

Tension Type Headaches (TTH)

- Muscle contraction or anxiety headache
- Accounts for 90% of all headaches
- Bilateral, dull, bandlike tightness
- No photophobia or phonophobia; doesn’t worsen with physical activity
- Believed to possibly be inflammatory in nature
- New information reveals 25% reduction in the strength of the neck extension muscles.

Tension Headaches

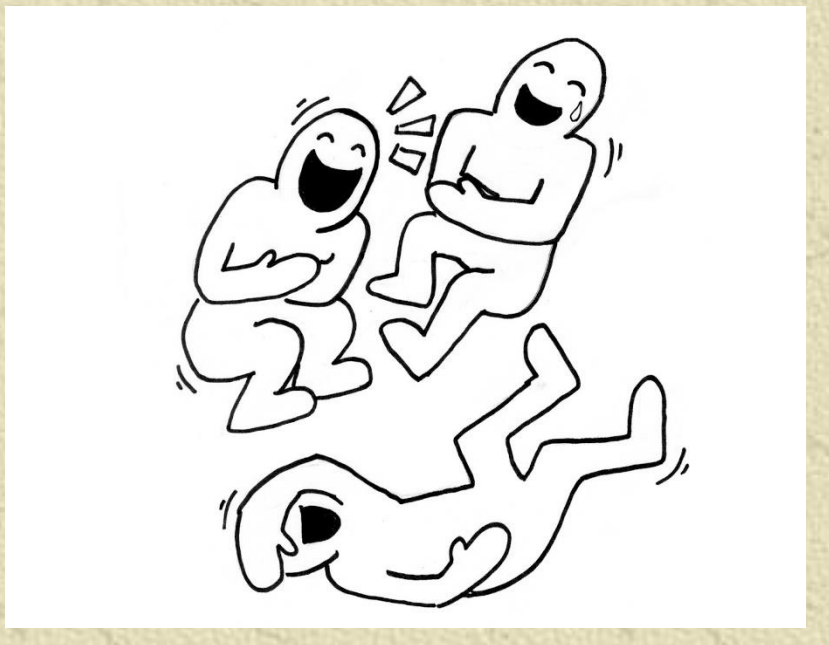
- EMG studies show that there is more muscle contraction with migraines
- Are they really all part of the same process?
- One study showed maxillary alveolar tenderness (tenderness in area of upper molars) in 1026 of 1100 patient with TTH or migraines. That's 93%!

Tension Headaches

- Episodic variant is associated with emotional or physical stress
- Chronic type often found with depression or taking too many OTC meds for pain
- Treatment usually consists of OTC NSAIDS; caffeine can help

Laughter induced headache

- No Joke!
- An actual diagnosis
- Only induced by “mirthful” laughter (not by evil laughter, for example!)



Central Nervous System Disease

- Intracranial mass
- IIH
- Subarachnoid Hemorrhage
- Meningitis

Tumor

- 30% of patients w/brain tumor have a mild HA which is typically intermittent, dull, aching, unilateral, and worsening over time
- Classic brain tumor HA (seen in only 17%)—a severe HA that wakes the pt. up in the middle of the night, accompanied by nausea
- More typical is a HA that is worse in the morning or with a change in body position, coughing or straining

Tumor HA

- Pain can be frontal or located at the site of the lesion. Often mimics migraine
- Neurological symptoms such as dizziness, tinnitus, tingling, and visual disturbances often occur (over time)

Aneurysmal Headache

- Worst headache of patients life. Extremely severe pain at site of rupture
- 50% of patients with AVM will have dull headaches for weeks leading up to the rupture
- Stiff neck
- Change in mental status

Aneurysm

- Third nerve palsy usually involving the pupil
- Hemiparesis
- VF defect
- Usually end up in the ER, not the eye doctor's office

Third Nerve Palsy

- Partial vs. Complete. Complete will show fixed , dilated pupil with ptosis and restricted motility. Eye will be down and out and patient will complain of diplopia
- May actually involve only the pupil where fibers are superficial

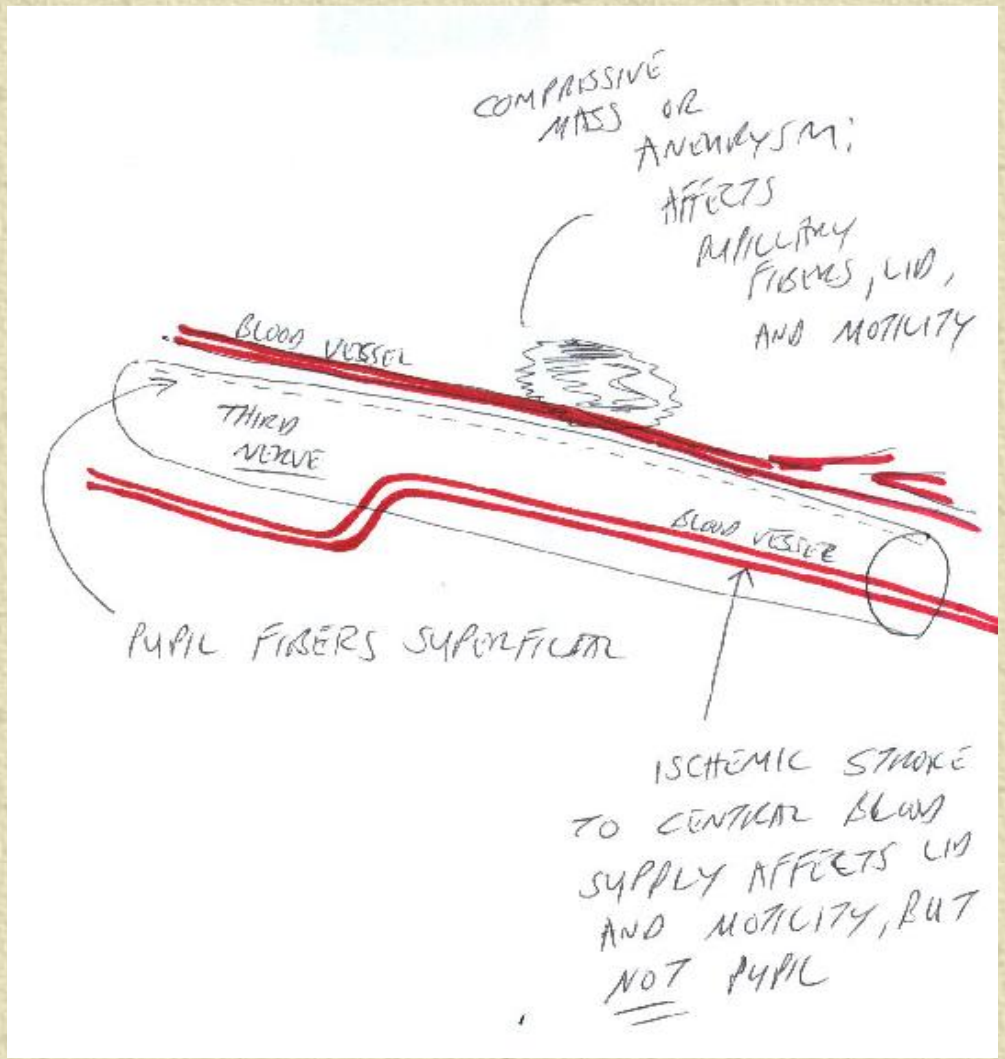
Pupil sparing / Pupil involving

- Rule of thumb : Pupil sparing third nerve palsies tend to be ischemic while those involving the pupil tend to be due to aneurysms or tumors
- Not a firm rule
- Pupil sparing may become pupil involving so follow very closely
- May get pupil involvement only in rare cases such as basilar artery aneurysms

Third Nerve Management

- Immediate MRI if any question of aneurysmal involvement. Patient may complain of a severe headache and will often have other neurological signs
- If patient is diabetic or hypertensive and the pupil is not involved, can consider not imaging, but 15-20% who fit this profile will have mass or aneurysm, so may be prudent to scan all

Pupil involving vs. pupil sparing



Left third nerve palsy

Idiopathic Intracranial Hypertension (IIH)

- Older term is “pseudotumor cerebri”
- Young overweight females (Females 8 X males)
- 1/ 100,000 in population as a whole ; 20 / 100,000 in 20 to 44-year-old women 10% over ideal weight
- May be related to medications including TCN (especially minocycline), HRT, lithium, Vitamin A, steroid withdrawal
- Emerging evidence that increased levels of testosterone / androgen may be the cause
- Sleep apnea link, especially in males
- Can affect children, and this is often overlooked
- Doubles cardiovascular risk in females

IIH

- Symptoms of transient blur, diplopia , tinnitus (intracranial noises, not just ringing)
- Headache is mild to moderate, and worse in the morning.
- ICP usually severely elevated ; normal is 50 – 200 mmH20. Over 25 cm (250 mm) is definitively abnormal. Single measurement can be misleading : levels can vary over 24 hours
- Very rare normal pressure variant

IIH more rare over age 50

- Less often female
- Fewer headache complaints
- More frequently discovered incidentally due to papilledema with no symptoms
- Lower opening CSF
- More likely to have concomitant medical conditions
- Less likely to use tetracycline family antibiotics

IIH

- Diagnosis requires normal MRI / MRV and CSF studies with elevated ICP
- Watch for spinal chord tumors
- Potential differential: Cerebral Venous Sinus Thrombosis / Stenosis
- MRV

CVST

- Young women and men
- Often not overweight
- Can be life threatening
- Treat with blood thinners, Diamox
- Can be seen with MRI, but often missed if MRV not performed
- Stenosis may just be secondary to IIH

Optic atrophy post CVST induced papilledema

IIH Management

- Refer to a neurologist
- Medical management includes Diamox , Lasix
- Weight loss

IIH Management

- If recalcitrant….
  - Repeated lumbar taps (ugh!)
  - Lumbo-peritoneal shunt
  - Ventricular shunt

IIH Management

- If progressive changes in visual acuity or visual field occur , consider an optic nerve sheath decompression
- Several small fenestrations in the optic nerve sheath are created to allow room for expansion
- Performed by a neuro-ophthalmologist. Often do worse eye only because 50% get improvement in the fellow eye

Papilledema IIH opening LP 550

After 3 weeks on Diamox

After 3 weeks on Diamox

Chronic IIH induced edema leading to atrophy: S/P decompression

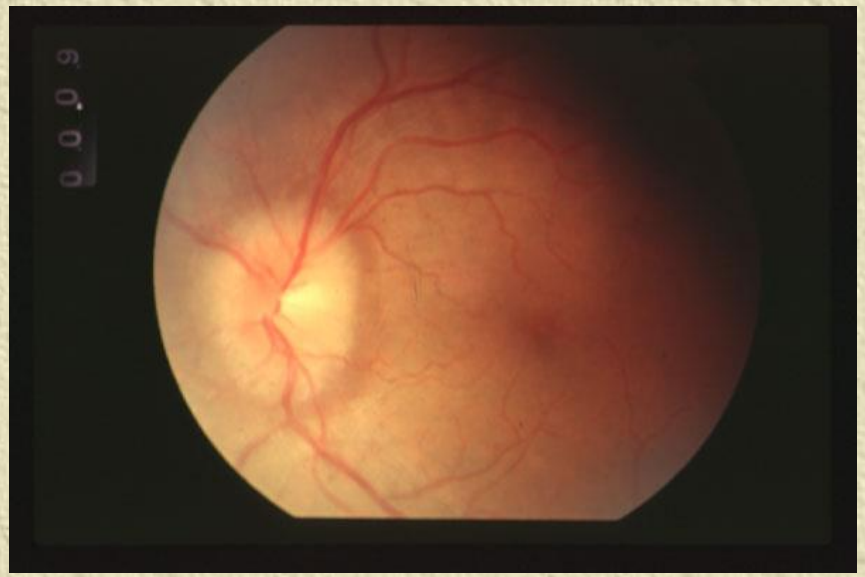
22 YO AA Female

Light perception

10/700

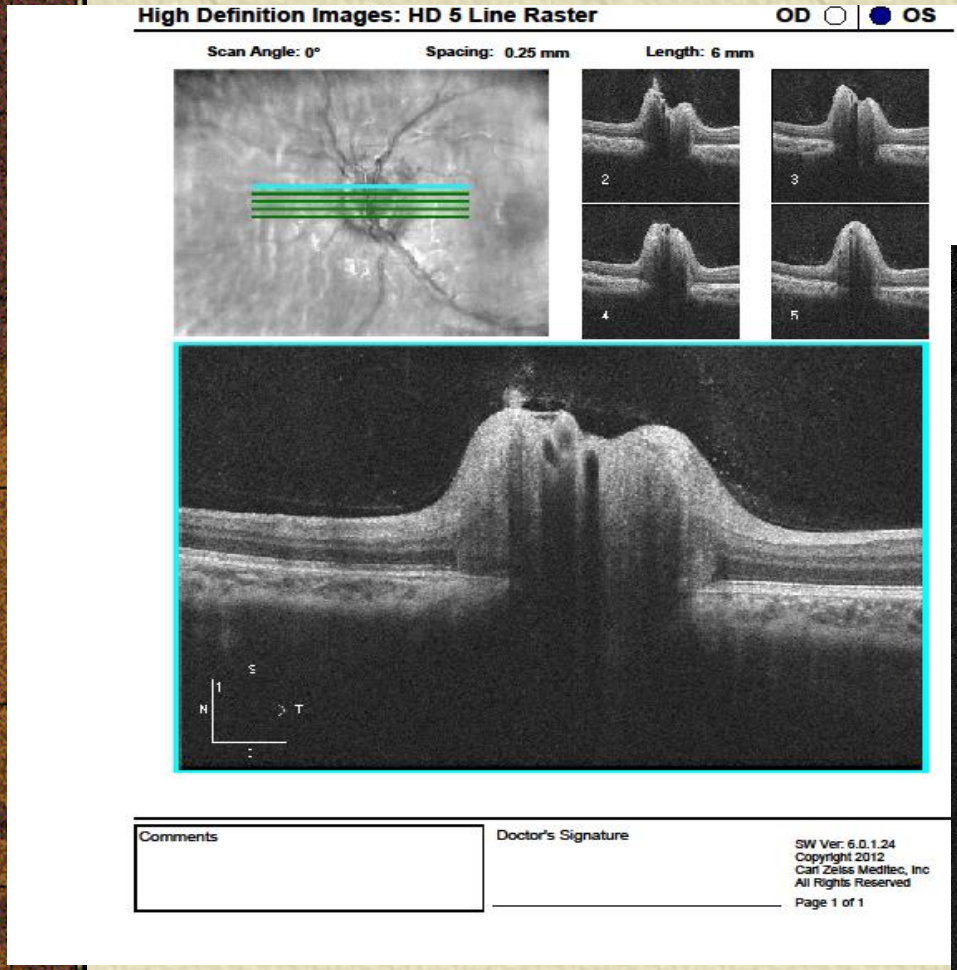
Patton's folds: RNFL thickness 231in OD, 295 in OS

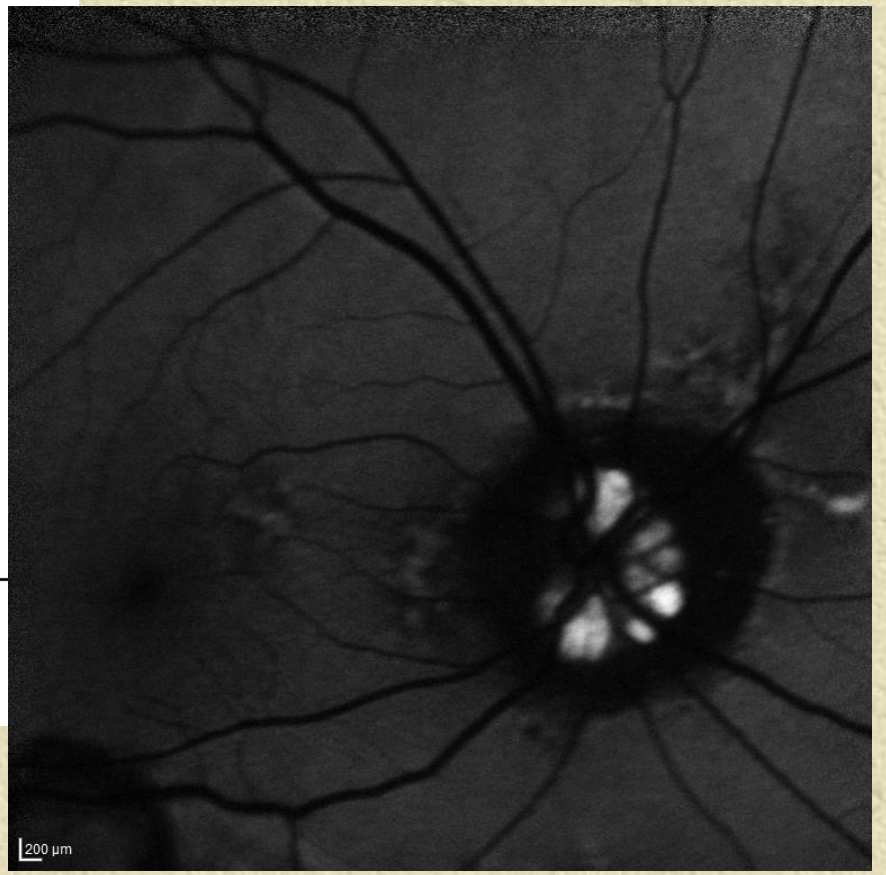
Papilledema (tumor)



Papilledema “plus” (Terson’s syndrome)

ONH DRUSEN SD OCT & FAF





Meningitis / Encephalitis

- Moderate to severe, generalized, throbbing headache
- Fever, vomiting, nausea, rash, changes in mental status
- Often photophobia and blurred vision
- Diplopia
- Cervical rigidity / neck stiffness

Systemic Disease

- Giant Cell Arteritis
- Stroke
- Hypertension
- Sinus Disease
- TMJ

Temporal (Giant Cell) Arteritis

- 1/1000 persons over age 60 (average 76, 80% over 70); most common in females (3-6:1). True emergency
- Must rule out in older patients with headache and vision loss
- Other symptoms include scalp tenderness, jaw claudication, malaise, anorexia, low grade fever. Emerging evidence that Zoster may be the cause, but this has been refuted in other studies
- Ocular issues: ION, artery occlusions, CWS

Temporal (Giant Cell) Arteritis

- Traditional thinking due to many past studies of much higher predilection in Caucasians, but…….
- Large 2019 study that included many Caucasian and many African American patients showed only a slight predilection for Caucasians, with significant involvement in African Americans

Temporal (Giant Cell) Arteritis

- Order stat Westergren sed rate, CRP, and CBC with platelets
- Normal is age/2 for males and age + 10 / 2 for females
- C-reactive protein is not specific for GCA but is essentially 100% sensitive
- Biopsy of temporal artery if strongly suspicious but negative testing
- Treat with high dose steroids average cumulative dose over 5000mg of prednisone

Temporal (Giant Cell) Arteritis

- Newly FDA approved treatment
- Subcutaneous Tocilizumub (Actemra)
- Used with steroids
- Immunosuppressant
- Risk of infections, no live vaccines
- Delivered SQ
- Also used with RA and other forms of arthritis

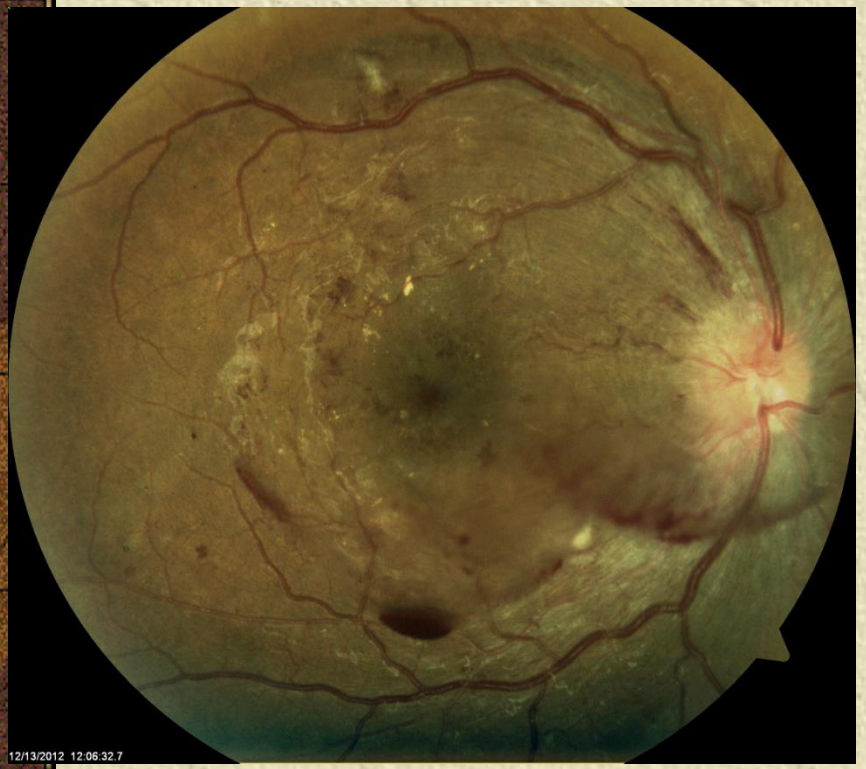
Stroke

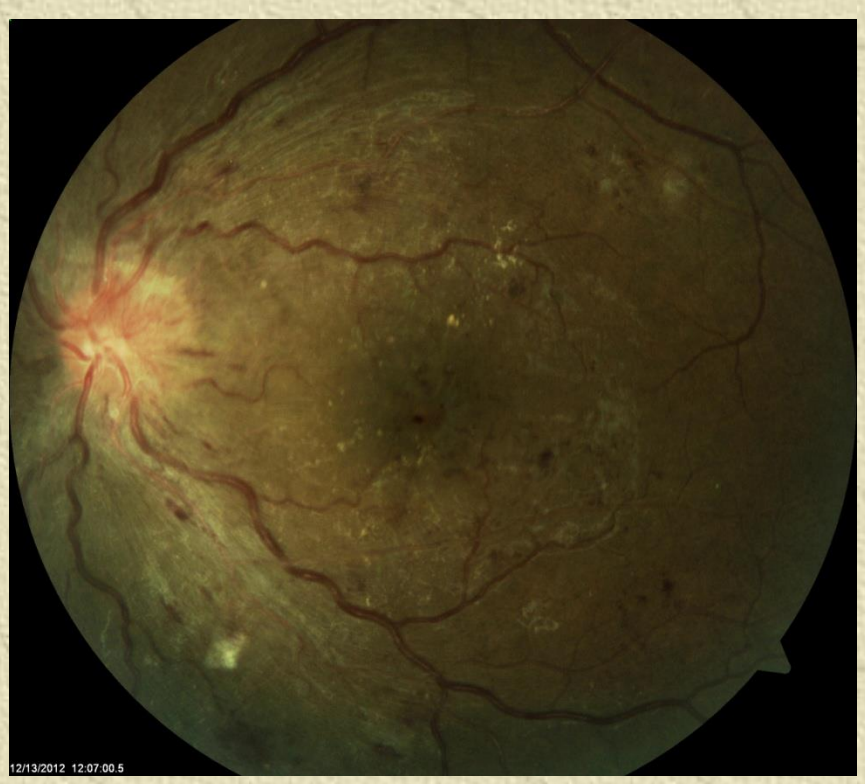
- On the same side as the infarct or hemorrhage
- Precedes the attack and lasts minutes to days
- Can be the cause of recent onset headache in the elderly

Hypertension

- Rare! Blood pressure must be sustained above 140 mmhg diastolic
- Can cause visual loss from severe papilledema with macular edema
- Pheochromocytoma, nephritis, malignant hypertension
- Pounding HA with nausea, tachycardia, sweating, pallor, and anxiety

BP 240 / 135





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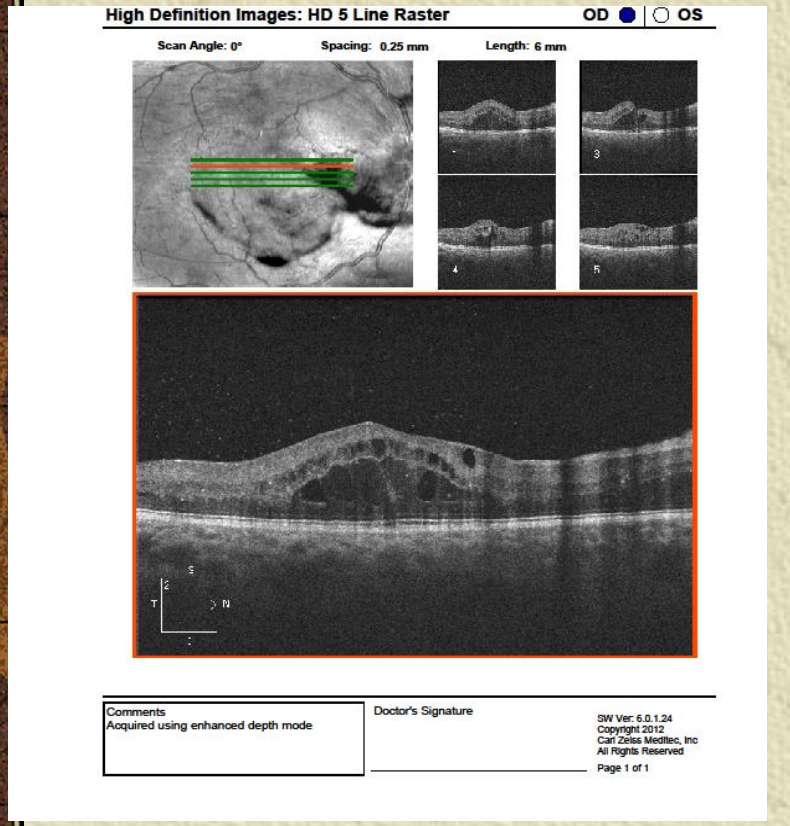
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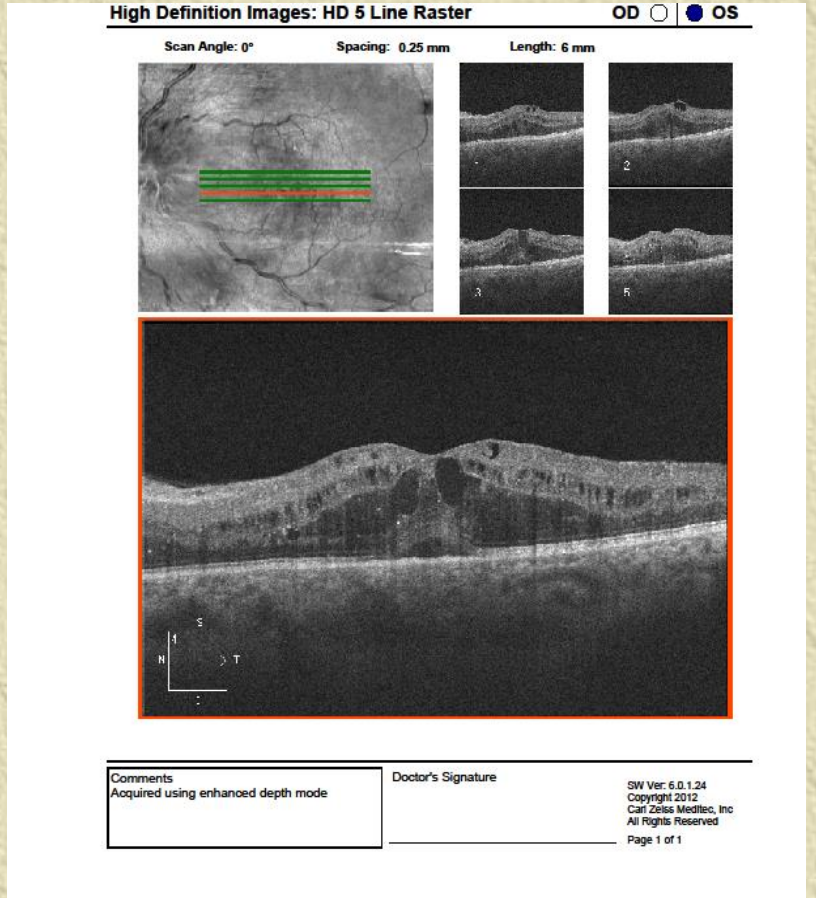
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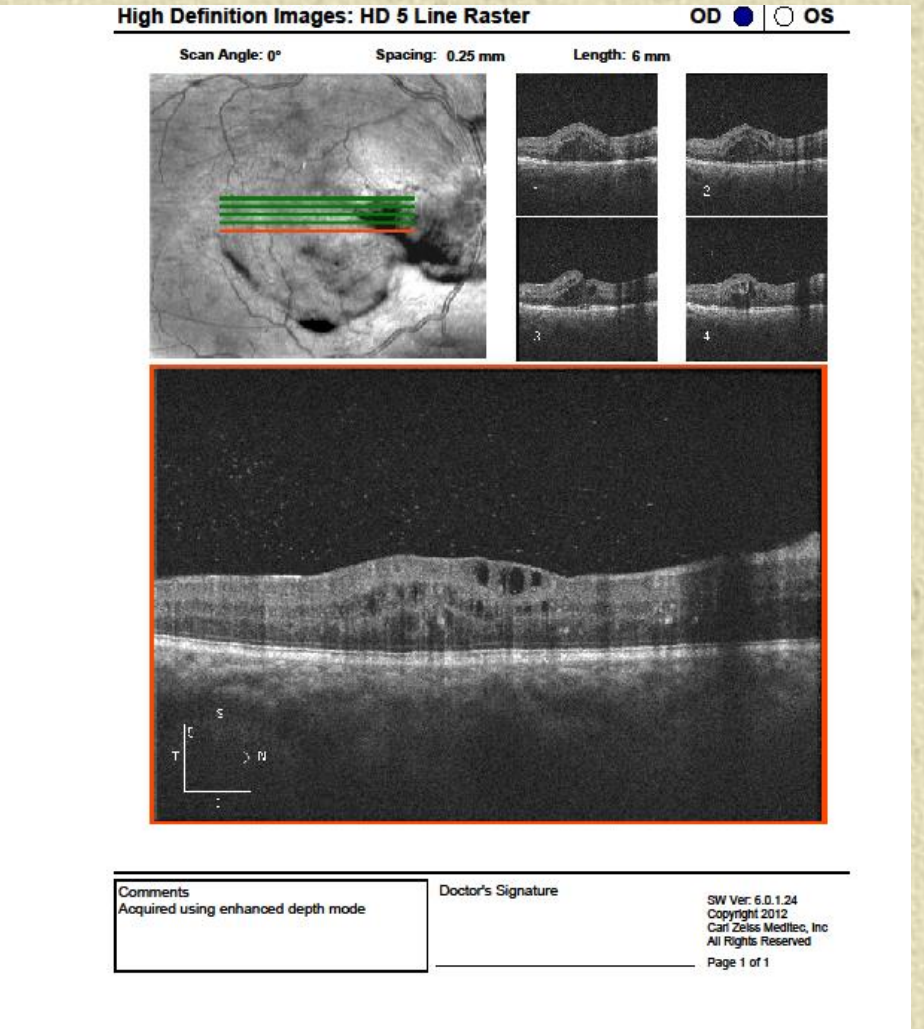
Bp 240 / 135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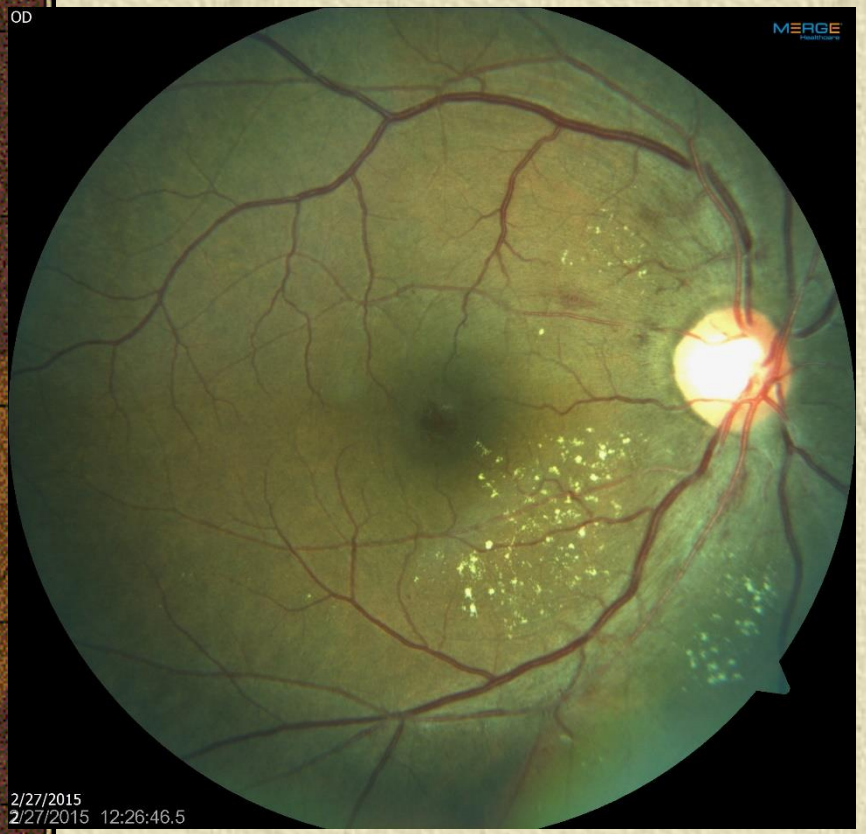
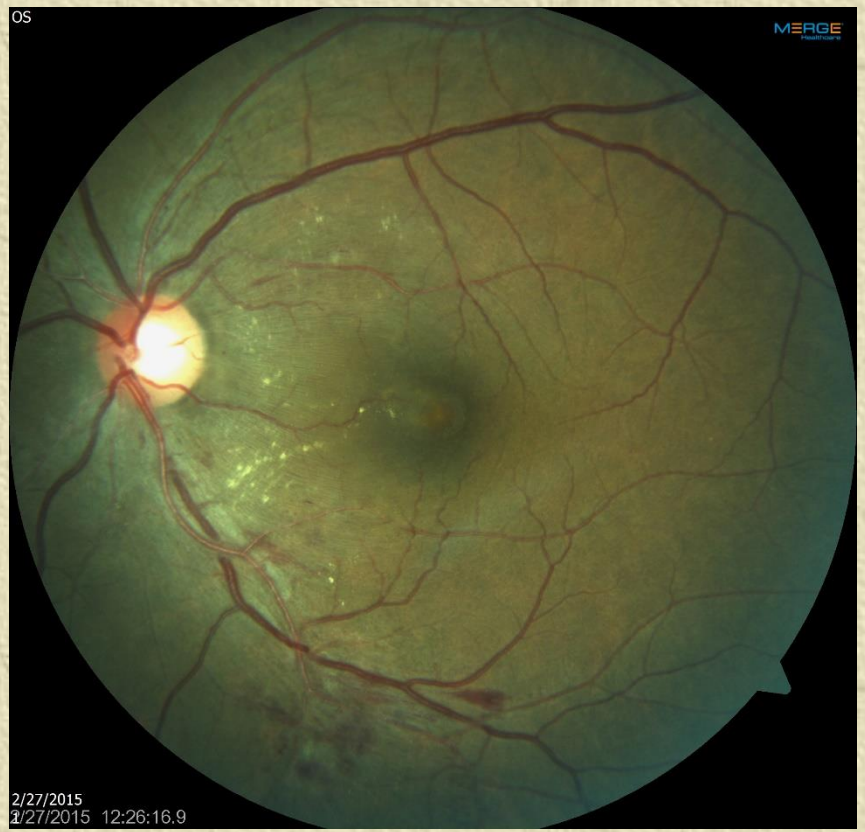
HTN retinopathy 20/20 OU





Sinus

- Acute; pain is almost always present
- Chronic; pain is almost always absent
- HA is frontal and can affect the malar area of the face, the teeth, and between or behind the eyes
- Congested feeling with nasal drainage, worsened by changing posture
- Treat with decongestants and OTC analgesics

TMJ

- Temporal mandibular joint (TMJ) syndrome
- Pain in trigeminal and facial nerve areas
- Age 15-40 , F>M
- 5% of population
- Originates from the jaw joint and is worse with chewing
- Jaw clicking or locking
- Manage with dental devices and analgesics
- Made worse by some OSA dental appliances

Ophthalmodynia

- Sharp, stabbing, fleeting pain localized to one eye
- Probably occurs along CN V ophthalmic branch
- Often a history of migraines is present
- Benign
- Cause is unknown
- Photo-opthalmodynia S/P TBI

Ocular Causes of Headache

- Angle closure glaucoma / other severe IOP spikes
- Uveitis, keratitis, scleritis
- Optic neuritis
- Refractive disorders and muscle imbalance
- Metastatic orbital tumors
- Ciliary Spasm

Headache Work-up Review

- HISTORY, HISTORY, HISTORY!
- CN evaluation when indicated
- Blood pressure
- Refraction
- Binocular/accommodation testing
- Sinus evaluation

Headache Work-up Review

- Complete ocular health assessment
- Visual field testing
- Correct referral is to a neurologist if possible
- Consider brain scan if suspect brain tumor, hx of seizures, recent head trauma, significant changes in HA, abnormal neurological signs
- THE END!