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

- “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 withdrawal
- 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
- Sixth most debilitating disease on earth
- 39 million in US, 1 billion world-wide
- 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 sufferers 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, Lopressor, 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 -0.50 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.
Cerebral Vasoconstrictive Agents:

- Ergot family: obtained from ergot fungus.
  - **Ergotamine tartrate** (Ergomar) - alpha adrenergic 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 monococular 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 to 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

Compressive mass or anomaly may affect arterial supply, nerves, lid, and motility.

Ischemic stroke to central blood supply affects lid and motility, but not pupil.
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
231 in 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 Tocilizumab (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
BP 240/135
Bp 240 / 135
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, 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!