

NEURO-OPHTHALMIC UPDATE

Joseph Sowka, OD
Greg Caldwell, OD



DISCLOSURE:

Joseph Sowka, OD is/ has been a Consultant/ Speaker Bureau/ Advisory Board member for Novartis, Allergan, Glaukos, and B&L. Dr. Sowka has no direct financial interest in any of the diseases, products or instrumentation mentioned in this presentation. He is a co-owner of Optometric Education Consultants



The ideas, concepts, conclusions and perspectives presented herein reflect the opinions of the speaker; he has not been paid, coerced, extorted or otherwise influenced by any third party individual or entity to present information that conflicts with his professional viewpoints.

DISCLOSURES- GREG CALDWELL, OD, FAAO

Will mention many products, instruments and companies during our discussion

- I don't have any financial interest in any of these products, instruments or companies

Pennsylvania Optometric Association –President 2010

- POA Board of Directors 2006-2011

American Optometric Association, Trustee 2013-2016

- Thank you to the members and those who join

I never used or will use my volunteer positions to further my lecturing career

Lectured for: Shire, BioTissue, Optovue

Advisory Board: Allergan

Involve: PA Medical Director, Credential Committee

He is a co-owner of Optometric Education Consultants



46 YEAR OLD MALE

- CC:** Patient reports a "droopy left eye" which began about 6 weeks ago. Headache and numbness ipsilateral; hives
- ER diagnosed with "stye". Patient was referred in by a local optometrist.
- Past Ocular History:** unremarkable
- Past Medical History:** (+) Mitral Valve Prolapse, (+) GERD and recent weight loss of about 20 lbs. over the past 6 months or so.
- Medications:** Prilosec, Metoprolol Succinate, Xanax, Prednisone, Lipitor, Claritin

PERTINENT FINDINGS

- BCVA 20/20 OD and 20/20 OS
- Pupils : *unequal*, round, reactive to light, No APD

Bright Illumination	Dim Illumination
OD: 4 mm	OD: 6 mm
OS: 3 mm	OS: 4 mm

- Motility and confrontation fields unremarkable
- Observation: LUL ptosis, Left miosis
- Intraocular pressure: 18 mmHg OD and 19 mmHg OS
- Funduscopy-unremarkable



So, what do you think and what do you want to do now?

POST-IOPIDINE



Pre-Iopidine



Post-Iopidine



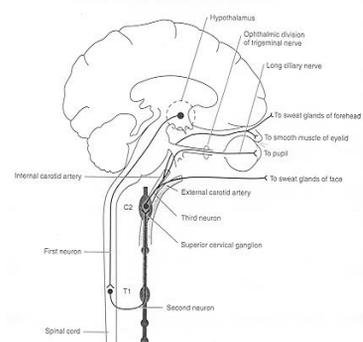
HORNER'S SYNDROME

- Etiology unclear based upon exam
- Headache, neuralgia and 'hives'
 - Not consistent with cluster migraine
 - Dx of exclusion, not convenience
 - Hives- not consistent with HZO
- Unexplained weight loss concerning-relationship unclear
- Recommend medical eval by PCP
 - Additional testing dictated by PCP results

DISCUSSION

What is Horner's Syndrome?

- a triad of clinical signs arising from disruption of sympathetic innervation to the eye and ipsilateral face that causes *miosis*, upper lid *ptosis*, mild elevation of the lower lid, and *anhidrosis* of the facial skin.



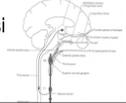
PHARMACOLOGICAL TESTING

- **Cocaine**
 - Horner's pupil doesn't dilate, normal pupil does
- **Hydroxyamphetamine (Paredrine)**
 - Differentiates post- from pre-ganglionic
 - Not available and doesn't matter because bad stuff happens everywhere
- **Apraclonidine 0.5% (Iopidine)**
 - Denervation supersensitivity
 - 36-72 hours from onset
 - Horner's pupil dilates, normal doesn't
 - Reversal more classic and diagnostic than cocaine

HORNER'S SYNDROME: ETIOLOGIES

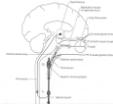
First-order neuron disorder: Stroke (e.g., vertebralbasilar artery insufficiency or infarct); tumor; multiple sclerosis (MS), and, rarely, severe osteoarthritis of the neck with bony spurs.

Second-order neuron disorder: Tumor (e.g., lung carcinoma, metastasis, thyroid adenoma, neurofibroma). Patients with pain in the arm or scapular region should be suspected of having a Pancoast tumor. In children, consider neuroblastoma, lymphoma, or metastasi



HORNER'S SYNDROME: ETIOLOGIES

- **Third-order neuron disorder:** Headache syndrome (e.g., cluster, migraine, Raeder paratrigeminal syndrome), internal carotid dissection, herpes zoster virus, otitis media, Tolosa-Hunt syndrome, neck trauma/tumor/inflammation, prolactinoma.
- **Congenital Horner syndrome:** Trauma (e.g., during delivery)
 - Facebook tomography
- **Other rare causes:** Cervical paraganglioma, ectopic cervical thymus

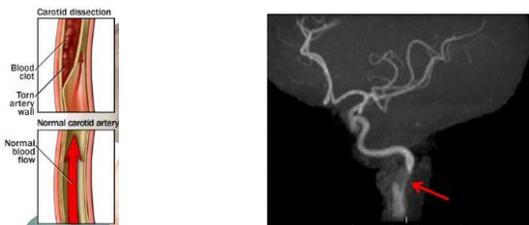


MANAGEMENT

- **Localizable- targeted workup**
 - Neck and facial pain- carotid dissection
 - Facial paraesthesia- middle cranial fossa disease
- **Necessary Work Up (non-localizable):**
 - MRI of brain, orbits and chiasm with and without contrast, attention to middle cranial fossa.
 - MRA of head and neck-rule out carotid dissection
 - MRI of neck and cervical spine, include lung apex and brachial plexus
 - Horner's syndrome patient needs to be imaged from chest to head- 3 scans
 - Horner's protocol
- **All imaging in patient unremarkable**

CAROTID DISSECTION

- **A 3rd-order Horner's and ipsilateral head, eye, or neck pain of acute onset should be considered diagnostic of internal carotid dissection unless proven otherwise.**



CAROTID DISSECTION

- Carotid artery dissection presents with the sudden or gradual onset of ipsilateral neck or hemicranial pain, including eye or face pain
- Often associated with other neurologic findings including an ipsilateral Horner's syndrome, TIA, stroke, anterior ischemic optic neuropathy, subarachnoid hemorrhage, or lower cranial nerve palsies
 - 52% with ocular or hemispheric stroke with 6 days
 - 67% within first week; 89% within 2 weeks; none after 31 days
- **Horner's from suspected carotid dissection should go to ER**

HORNER SYNDROME ALGORITHM

1. Confirm it is Horner syndrome
 - Apraclonidine; dilation lag
2. Determine if accidental or surgical trauma as cause
3. Urgent imaging
 - CT/CTA; MRI/MRA head and neck if present < 2 weeks
4. Image lung apex

RULE

Diagnosing Horner's syndrome is insufficient. You must try to ascertain a cause and never assume that it is benign.

CASE: 59 BF

- Long time patient presents for her glaucoma f/u. She reports drooping in the right eye and smaller pupil for about 1 month. Symptoms were noticed at/ about time of dx of lung cancer and subsequent surgery.
 - She also reports scapular pain and weakness in the right hand.
- Past Medical History: (+) Lung Cancer, (+) Pancreatitis, (+) HTN and (+) Acid Reflux
- Social History: Smokes 1 pack per day for 45 years, Drinks a 6 pack of beer daily



CASE: PERTINENT FINDINGS CONTINUED...

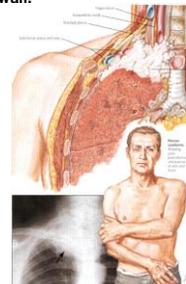
- Pharmacological testing not done
- New onset of ptosis and miosis with dx lung cancer and h/o recent lung surgery
- Dx=Pancoast Syndrome

PANCOAST TUMOR

A Pancoast tumor is a lung cancer arising in the apex of the lung that involves structures of the apical chest wall.

Treatment

- Chemotherapy
 - Radiation Therapy
 - Surgery: lobectomy vs. wedge resection
- Prognosis: 5 year survival rate is around 30%
- Not an emergency



ODE TO HORNER'S SYNDROME

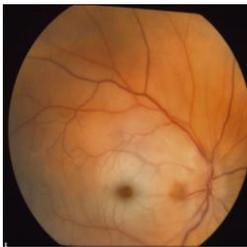
When the lid is low and the pupil small,
 Check to see the sweat don't fall.
 Cocaine is no longer universal,
 Iopidine will cause reversal.
 You have to scan head to chest,
 And remember that MRA is best.
 Pain in association, will surely cause
 commotion.
 Send to the ER without correction,
 Remember, it might be carotid dissection.

Joseph Sowka, OD

80 YEAR OLD MAN

- Reports a sudden loss of vision OD
- Vision is count fingers at 2 feet OD and 20/25 OS
- APD OD grade 4
- Fundus photos OU

PHOTOS OU



CRAO TREATMENT/WORK-UP/FOLLOW-UP?



- Anterior chamber paracentesis (less than 24 hours)
- STAT blood work
 - 2-10% of acute CRAOs are caused by thrombosis from Giant Cell Arteritis (GCA)
 - Sed-rate
 - C-reactive protein
 - Qualitative
 - CBC with differential
- Monitor retinoveascular function, every 3-6 weeks

CRAO, BRAO, TIA (AMAUROSIS FUGAX)

- **Acute Stroke Ready Hospital**
 - Certification recognizes hospitals that meet standards to support better outcomes for stroke care as part of a stroke system of care
 - Developed in collaboration with the Joint Commission (TJC), eligibility standards include:
 - Dedicated stroke-focused program
 - Staffing by qualified medical professionals trained in stroke care
 - Relationship with local emergency management systems (EMS) that encourages training in field assessment tools and communication with the hospital prior to bringing a patient with a stroke to the emergency department
 - Access to stroke expertise 24 hours a day, 7 days a week (in person or via telemedicine) and transfer agreements with facilities that provide primary or comprehensive stroke services.
 - 24/7 ability to perform rapid diagnostic imaging and laboratory testing to facilitate the administration for IV thrombolytics in eligible patients
 - Streamlined flow of patient information while protecting patient rights, security and privacy
 - Use of data to assess and continually improve quality of care for stroke patients
- **Warn hospital is suspicion for GCA**
- **20% of stroke or heart attack within 3 years**
- **However of those who experienced CVA or MI**
 - 80% were within 24-48 hours; those remaining
 - 50% occurred in 2 weeks
 - Majority within the next 90 days
- **Not PCR, not retinologist, just the Acute Stroke Ready Hospital!**

Guidelines



- **Any patient with suspected TIA or those with acute retinal ischemia should be evaluated urgently in order to identify those at high risk of immediate cerebral infarction and cardiac ischemia**

Guidelines for the prevention of stroke in patients with stroke or transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 2013; 43: 227-276

Adapted from Drs. Nancy Newman and Biousse; 2015

All Patients with Acute Retinal Arterial Ischemia



- **MUST** have immediate brain imaging
 - Brain MRI with DWI >>> Head CT
- Including patients with transient visual loss (presumed of vascular origin)

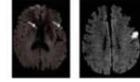


Presence of cerebral ischemia portends higher risk of stroke

Adapted from Drs. Nancy Newman and Blouisse; 2015

Concurrent Acute Brain Infarcts in Patients with Monocular Visual Loss

- ¼ with acute retinal ischemia had acute brain infarction (anywhere) on brain DWI-MRI
 - Infarctions often small, multiple, ipsilateral to retinal ischemia, asymptomatic
- DWI-MRI abnormal in:
 - 33% with CRAO/BRAO vs 18% with TVL
 - 28 % with embolic vs 8% non-embolic retinal ischemia



Adapted from Drs. Nancy Newman and Blouisse; 2015

Study #2

Co-occurrence of Acute Retinal Artery Occlusion and Acute Ischemic Stroke: Diffusion-Weighted Magnetic Resonance Imaging Study

JUNWON LEE*, SEUNG WOO KIM*, SUNG CHUL LEE, OH WOONG KWON, YOUNG DAE KIM, AND SUK HO BYEON

Am J Ophthalmol 2014; 157: 1231-1238

Adapted from Drs. Nancy Newman and Blouisse; 2015

Co-occurrence of acute retinal artery occlusion and acute ischemic stroke: Diffusion-weighted magnetic resonance imaging study

- 33 patients with CRAO (18) and BRAO (15)
- Evaluated similarly to acute stroke patients (DWI)
- ¼ with acute retinal ischemia had acute brain infarction (anywhere) on brain DWI-MRI
 - 5/18 CRAO; 3/15 BRAO
 - Infarctions often small, multiple, ipsilateral to retinal ischemia, may be asymptomatic
 - Abnormal DWI-MRI strongly correlated with major cause of stroke (even when neurologically asymptomatic)

Adapted from Drs. Nancy Newman and Blouisse; 2015

DWI in Acute Retinal TIA/Ischemia

- DWI-MRI identifies subgroup of patients at very high risk of major stroke
- DWI-MRI needs to be performed within 24/48 hours of visual loss to allow for effective prevention of recurrent stroke

Adapted from Drs. Nancy Newman and Blouisse; 2015

Tell the patient:

- "Go to the Emergency Department"



- "Tell them you had a retinal stroke"
- Do not send these patients to their PCP, cardiologist, neurologist, neuro-ophthalmologist
- Do not try to obtain the workup yourself

Adapted from Drs. Nancy Newman and Blouisse; 2015

35 YEAR OLD MAN

- Wants another opinion due to “hemorrhage on my right eye”
- Happened 3 days ago after vomiting
 - Claims food poisoning from chicken Caesar salad
 - Still feels a little nauseated
- Saw ophthalmologist 3 days ago, told he had a bruise on his eye and it should go away in 1-2 weeks

35 YEAR OLD MAN

BVA 20/100 OD, 20/70 OS

- Hx of amblyopia OD
- Current Rx OD +5.50 OS +4.50

Any concerns?

Patient noticed blurry vision OS

- Started 2 weeks ago
- Did not mention because he is more concerned about the blood on his right eye

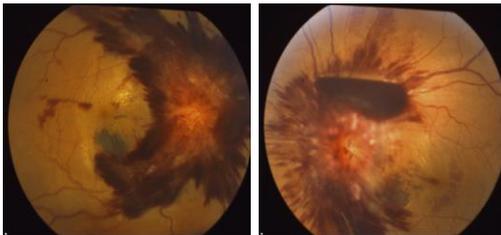
Headaches for 2 weeks, decrease if patient stands up

ROS: unremarkable

Decide to dilate OU



RETINAL FINDINGS DISCUSSION



DIFFERENTIAL DIAGNOSIS

- Hypertensive retinopathy
- Blood dyscrasia
- Terson's syndrome
- Valsalva retinopathy
- Purtscher's retinopathy
- Shaken baby syndrome

TERSON'S SYNDROME

- Terson's syndrome originally was defined by the occurrence of vitreous hemorrhage in association with subarachnoid hemorrhage.
- Terson's syndrome now encompasses any intraocular hemorrhage associated with intracranial hemorrhage and elevated intracranial pressures.
- Intraocular hemorrhage includes the development of subretinal, retinal, subhyaloidal, or vitreal blood.
- The classic presentation is in the subhyaloidal space.

TREATMENT

- Emergency referral to neurologist due to high suspicion of intracranial hemorrhage and elevated intracranial pressure
- Intracranial hemorrhage confirmed with MRI
- Patient later diagnosed with Hairy Cell Leukemia and cryptococcal meningitis

63 YEAR OLD FEMALE

- **CC:** Referred for “non-specific conjunctivitis”
 - The best conjunctivitis that she ever had!
- **Medical Hx:** Unremarkable
- **Conjunctivitis treated successfully by Attending & Resident:**
 - Concern over funny lid positioning
 - “Consider MG evaluation”
- **Key Finding:** Pictured



63 YEAR OLD FEMALE

What questions do you want to ask?
What tests do you want to perform?

63 YEAR OLD FEMALE

- **Do you ever have double vision? Yes!**
 - In extreme gaze up, down, right, and left
- **Ocular motility findings:**
 - Abduction, adduction, elevation, and depression deficits
- **Forced duction testing: Positive**
- **“This is not a boating accident!”**
 - And it isn't myasthenia gravis either!

Preliminary diagnosis?
What tests do you want to order?

63 YEAR OLD FEMALE

- **Presumptive diagnosis:**
 Primary aberrant regeneration of CN III from lesion in cavernous sinus
- **Plan:**
 Refer for MRI of orbits and chiasm with detail to cavernous sinus/parasellar area

CN III PALSY: ABERRANT REGENERATION

- **Damage to CN III results in resprouting and miscommunication of nerves to muscles**
 - Inferior rectus and medial rectus communicates with levator
 - Medial rectus communicates with pupil
- **Clinical picture:**
 - Patient looks medial: lid elevates
 - Patient looks lateral: lid lowers
 - Patient looks down: lid elevates (Pseudo-Von Graefe's- most characteristic sign)
 - Patient looks medial: pupil constricts



CN III PALSY: ABERRANT REGENERATION

- **Primary: Occurs independent of antecedent CN III Palsy. Caused by aneurysm or meningioma within cavernous sinus**
 - Slow growing with subclinical compression and regeneration concurrently
- **Secondary: Occurs after an antecedent CN III palsy. Causes:**
 - Aneurysm, trauma, tumor, inflammation
 - NEVER DIABETES
 - If cause of CN III palsy is determined to be ischemic vascular and then the eye undergoes aberrant regeneration, the initial diagnosis is wrong. You must re-examine for tumor or aneurysm within ipsilateral cavernous sinus.

63 YEAR OLD FEMALE

- **MRI results: Cavernous sinus “pristine and perfect”**
- **HOWEVER, soft tissue mass seen in orbit.**
- **CN III aberrant regeneration?**
 - No
- **Diagnosis:** probable orbital malignancy
- **Primary care evaluation:** Breast carcinoma
- **Orbital biopsy:** Metastatic carcinoma

OCULAR/ORBITAL METASTASIS

- **Metastatic cancer – spread from one system to another via blood or lymphatic channels**
- **Most common primary tumor sites:**
 - **Breast** > Lung > GU tract > GI tract > Skin
- **Most common ocular metastasis sites:**
 - Choroid > **Orbit** > Iris > Lids > Optic nerve
 - The discovery of ocular metastasis is an exceedingly poor prognostic indicator...

MANAGEMENT OF OCULAR METASTASIS

- **Treatment is palliative**
- **Modalities include:**
 - Concurrent chemotherapy
 - Irradiation
 - Local excision
 - Enucleation / exenteration
- **Despite therapy, average survival is 7-9 mos.**
- **Outcome of this patient?**

Now who thinks that was a scary case?

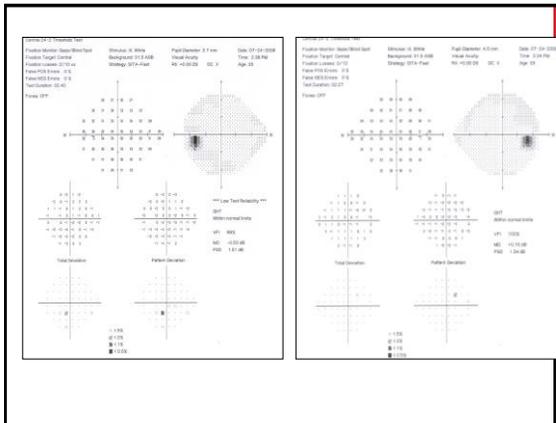
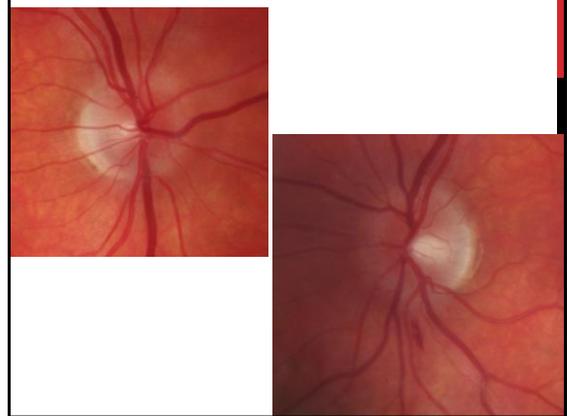
Now for a REALLY scary case

WORLD'S BEST DISC HEMORRHAGE

- **33 YOWM**
- **Occipital HA x 4 mos**
 - Visual aura with HA
- **Worsens when standing after sitting**
- **Relieved by sleep**
- **Denies vision loss, nausea, diplopia, pain on eye movement, behavioral changes**

WORLD'S BEST DISC HEMORRHAGE

- 20/20 OD, OS with myopic correction
- Pupils, EOMs, conf fields normal OU
- Biomicroscopy normal OU
- IOP 12 mm Hg OU
- Nasally obliquely inserted nerves

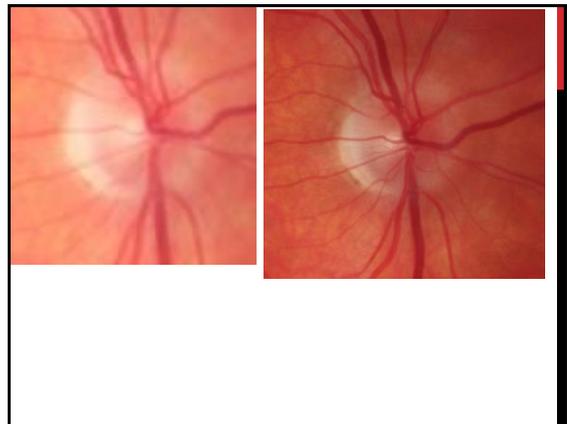


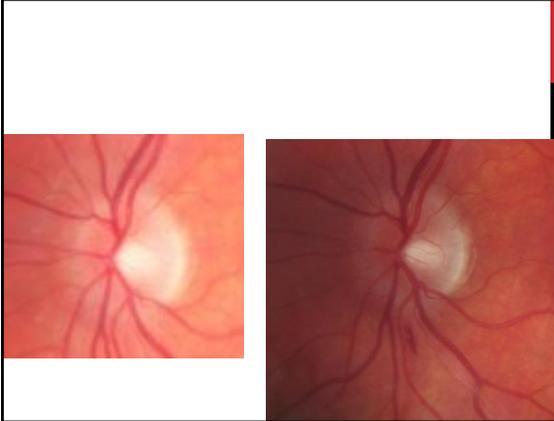
WORLD'S BEST DISC HEMORRHAGE

- Co-manage with PCP- internist
- MRI w and w/o contrast of brain and orbits
- Complete blood work blood work up including FTA-ABS/RPR ; Lyme titer; CBC w/differential
- Rule out mass lesion, infections, collagen vascular and autoimmune etiology.

WORLD'S BEST DISC HEMORRHAGE

- MRI
- Pt had MRI done and mass was identified in fronto/parietal region more toward right side
- Outcome?





88 YEAR OLD MAN I SEE FACES OF FRIENDS THAT I HAVE NOT SEEN FOR YEARS, WHEELS OF CARS AND AT TIMES PINE TREES

BVA
Count fingers at 2 feet OU

Current Correction
R plano
L -1.00 sphere

EOMS: full, unrestricted
CT: ortho D/N by Hirschberg

PERRL (-)APD
CF: central defect OU

RECOMMEND PSYCHE CONSULT?

- **Alert and Oriented x 3**
 - Person
 - Knows who he is, who is with him
 - Place
 - Knows where he is, knows where he lives
 - Time
 - Knows what month, day, date and year

DIAGNOSIS AND TREATMENT?



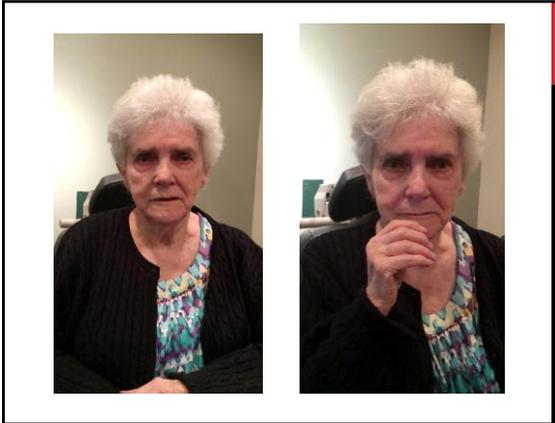
CHARLES BONNET SYNDROME

“Release Hallucination”

- **Visual hallucinations**
 - Irritative (brief)
 - Epilepsy
 - Migraine
 - Release (continuous)
 - Stroke
 - Sensory deprivation

TREATMENT

- **Reassurance**
 - That this is normal for patient with severe vision loss to experience hallucinations



47 YEAR FEMALE

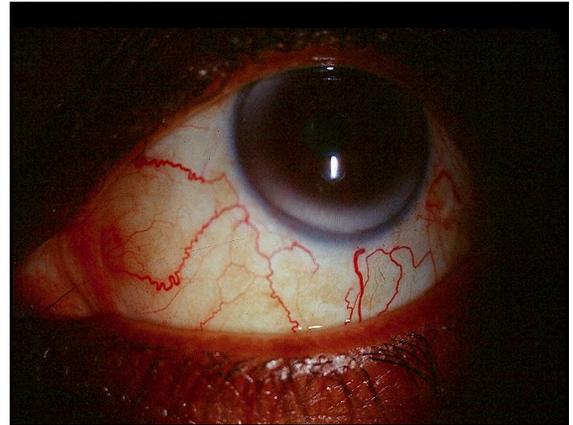
- **CC:** Horizontal double vision in far left gaze
- **BVA:** 20/20 OD, OS
- **Medical Hx:** newly diagnosed diabetes
- **Left abduction deficit in far left gaze**
 - Negative forced duction test
- **Mild ocular injection OS**
- **IOP:** 14 mm Hg OD, 16 mm Hg OS
- **Fundus:** normal OU

47 YEAR OLD FEMALE

- **Presumptive diagnosis:** Left vasculogenic CN VI palsy- monitor
- Returns 1 week with marked worsening of injection, diplopia and ophthalmoplegia
- **IOP:** 16 mm Hg, 26 mm Hg
- **Fundus disc congestion and vascular tortuosity OS**

What does she look like NOW?

What do you want to do NOW?



47 YEAR OLD FEMALE

CT scan:



What do you think NOW?

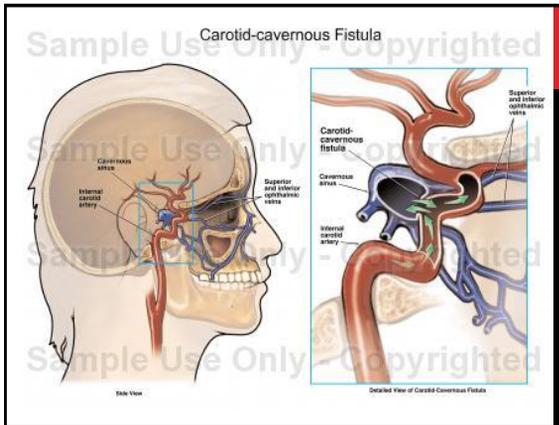
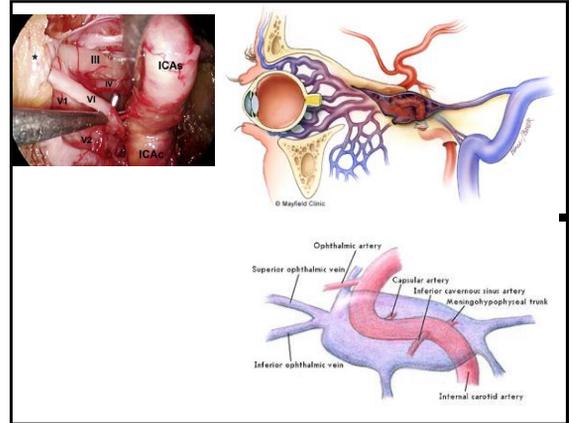
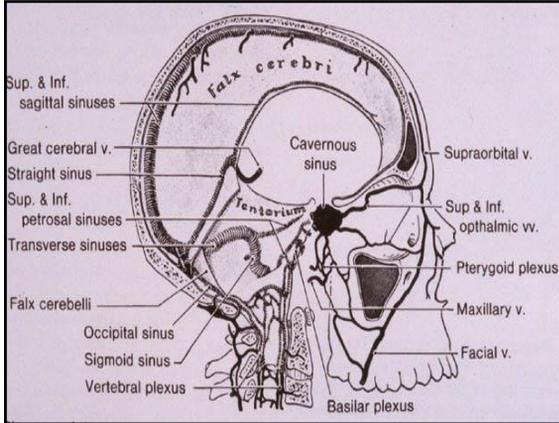
CAROTID CAVERNOUS SINUS FISTULA

Cavernous sinus. . .

- Trabeculated venous cavern
- Houses CN III, IV, VI, V1, oculosympathetics, and ICA
- Drains eye and Adnexa via inferior and superior ophthalmic veins to petrosal sinuses and jugular vein

Fistula. . .

- Rupture of ICA or meningeal branches within sinus
 - Meningeohypophyseal, McConnell's Capsular, Inferior Cavernous
- Mixing of arterial blood in venous system



CAROTID CAVERNOUS SINUS FISTULA

Hemodynamic

- High flow vs low flow

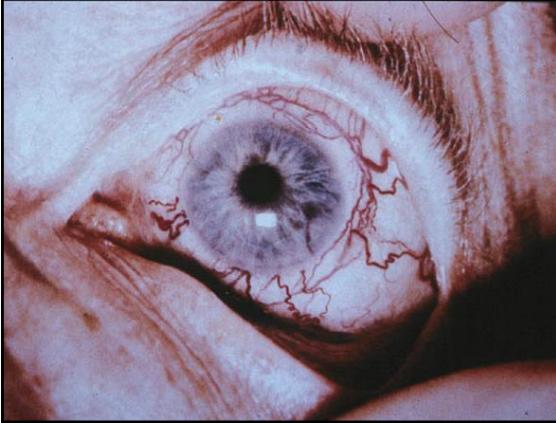
Angiographic

- ICA vs meningeal branches

Etiology

- spontaneous vs traumatic





CAROTID CAVERNOUS SINUS FISTULA

- Increased venous pressure
- Orbital congestion
- Proptosis (pulsatile)
- Corneal exposure
- Arteriolization
- Orbital bruit
- Myopathies and cranial neuropathies with diplopia
- Secondary glaucoma

CAROTID CAVERNOUS SINUS FISTULA

- Vision threatening – not life threatening
- Spontaneous etiology – spontaneous resolution
 - ICA compression with contralateral hand
- Traumatic – clipping and ligation
- Balloon or particulate embolization
- Manage glaucoma aggressively
 - Prostaglandin analogs

RULE: BEWARE THE CHRONIC RED EYE

- Dilated & tortuous episcleral vessels that go to the limbus and back (omega loops) Ω
- Intervening “clear conjunctiva”
- Red eye that doesn’t respond to any topical treatments
 - Bag-o-Meds
- Other non-red eye findings: Chemosis, IOP elevation, proptosis, ophthalmoplegia, ptosis, lid edema

ODE TO A FISTULA

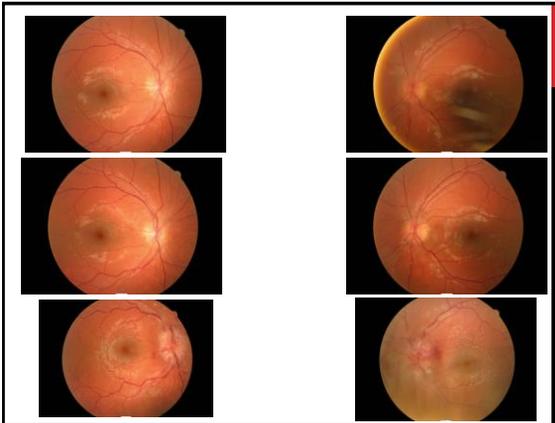
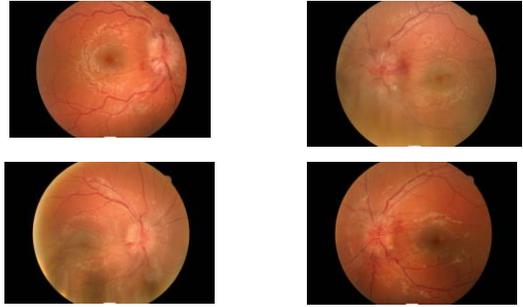
Beware the chronic red eye
 It isn't infected, inflamed, or dry.
 When corkscrew vessels makes the eye reds
 And the patient has bag-o-meds.
 The problem is deep
 And arterial blood has begun to seep.
 Your first fistula you will always miss
 But on your second case you will never be remiss

Joseph Sowka, OD

16 YEAR BOY

- Vision has been fluctuating for 6 weeks
- PCP feels it's normal growth spurt
- Mom feels it's migraines as there is a strong family history
 - Still wants eyes checked
- VA 20/20 OD/OS uncorrected
- Externals: normal
- Meds
 - Inhaler for asthma PRN
 - Minocycline 50 mg BID PO for acne

IIIH: "IT'S NOT RARE IF IT'S IN YOUR CHAIR"



PRECAUTIONS WITH ORAL TETRACYCLINE ANALOGS

- Enhanced photosensitivity
- Avoid in children and pregnancy (Category D)
- Can enhance Coumadin
- Can enhance the action of digoxin
- ?Long term use with increase risk of breast cancer?
 - 1 paper/study, not regarded as highly reliable study
 - Further investigation discredited the association
- Benign intracranial hypertension, reported cases
 - 17 cases from 1978-2002



6 MONTH LATER



1 YEAR LATER**CASE:
23 YEAR OLD WHITE FEMALE**

- **CC:** Sudden onset pupil dilation with ipsilateral headache
- **Medical Hx:** normal
- **BVA:** 20/20 OD, OS
- **Pupils:**
 - 3 mm anisocoria, OS larger, anisocoria greater in bright illumination. Previously isocoric. (-) RAPD, (+) Accom
- **Remainder of exam normal**
- **Similar incident 2 days antecedent, resolved within hours**
- **What does she look like?**

**CASE:
23 YEAR OLD WHITE FEMALE**

What questions do you want to ask?

What tests do you want to order?

**CASE:
23 YEAR OLD WHITE FEMALE****Additional questions to ask:**

- *Any double vision?* No!
- *Any use of ophthalmic pharmaceuticals?* No!
- *Any history of migraine headaches?* Maybe...

Differential diagnosis?

Aneurysmal compression on CN III? **No**
Pharmacological misadventure? **No**

**BENIGN EPISODIC PUPILLARY
MYDRIASIS****Episodic unilateral mydriasis**

- Lasts minutes to weeks

Accompanied by blurred vision and headache

Young, healthy females (*may have migraine history*)

Peculiar sensations about affected eye

- Often progresses to headache
- Not typical migraine

Defective accommodation

Lid and motility defects not present

Extensive medical testing unremarkable

BENIGN EPISODIC PUPILLARY MYDRIASIS

- Anisocoria greater in bright than dim
 - Parasympathetic dysfunction
 - Not an aneurysm
 - Edinger-Westphall lesion?
- Migraine variant – most likely etiology
- Treatment – none except to avoid unnecessary testing

PUPIL RULES

- Anisocoria greater in dim = sympathetic dysfunction
 - Horner's syndrome- look for dilation lag
 - Miotic use
- Anisocoria greater in light = parasympathetic dysfunction
 - CN 3 palsy
 - Tonic pupil
 - Pharmacologic or traumatic pupil
 - No reactivity?

PUPIL RULES

- Fixed and dilated and unresponsive to light or near = pharmacologic or iris trauma



RULE: ISOLATED DILATED PUPIL IS ALMOST NEVER AN ANEURYSM

Ambulatory patients with isolated dilated pupil more likely to harbor iris or ganglion (Adie's) lesion or medication misadventure than CN 3 palsy

Comatose patient is a different story

Risk of angiography is much higher than risk of aneurysm in this setting

No imaging needed for isolated dilated pupil

65 YEAR OLD WOMAN

- Referred by an optometrist due to corneal edema and map-like anterior opacities. Impression is EBMD versus corneal degeneration.
- Patient reports decreasing vision over past 6-9 months. Especially at near
- Vision 20/50 OU

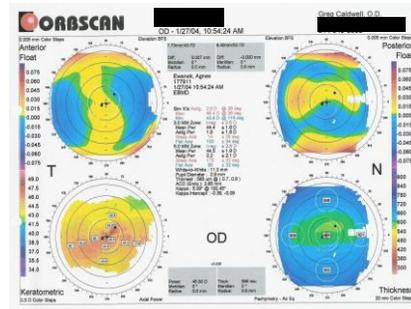
CORNEA OD



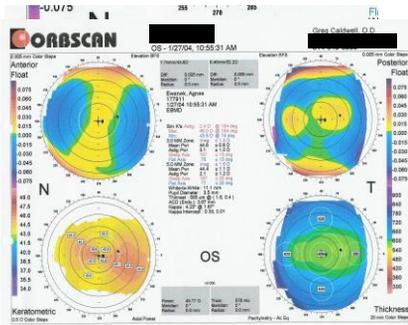
PATIENT'S MEDICATIONS

- Baby ASA
- Lanoxin
- Synthroid
- Glucophage
- Pravochol
- Amiodarone
- Neurotin
- Zolof
- Vitamin E

TOPOGRAPHY



TOPOGRAPHY



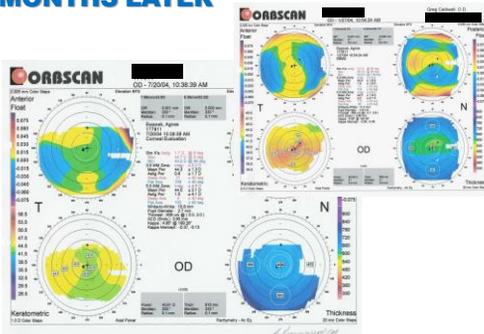
CALLED PRIMARY CARE PHYSICIAN TO DISCUSS FINDINGS

D/C amiodarone

Primary Care Physician switches patient to diltiazem

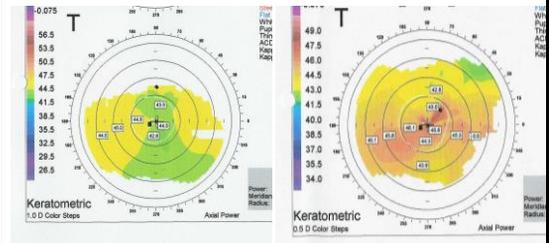
Class	Action	Drugs
I	Sodium channel blockade	Quinidine, Procainamide, Disopyramide, Lignocaine, Mexiletine, Tocainide, Flecainide, Phenytoin
II	β -adrenergic blockade	Propranolol, Acebutolol, Carvedilol, Esmolol ...
III	Prolong repolarisation	Amiodarone, Bretylium, Sotalol, Difetilide, Azimilide
IV	Ca2+ antagonism	Verapamil, Diltiazem, Semotiadil

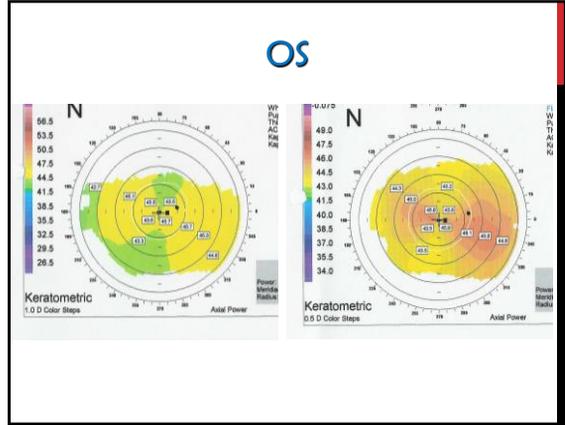
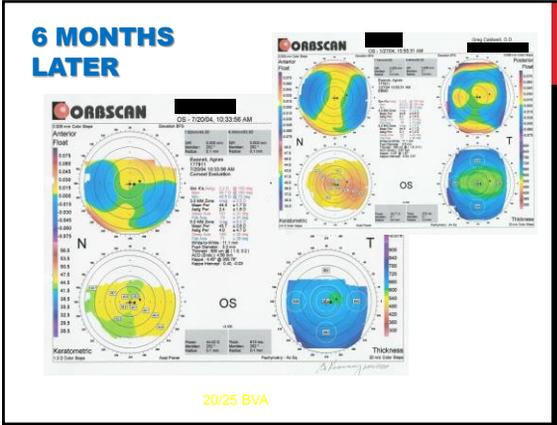
6 MONTHS LATER



20/25 BVA

OD





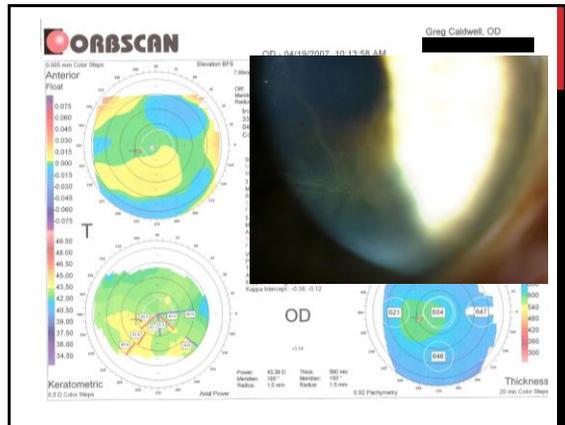
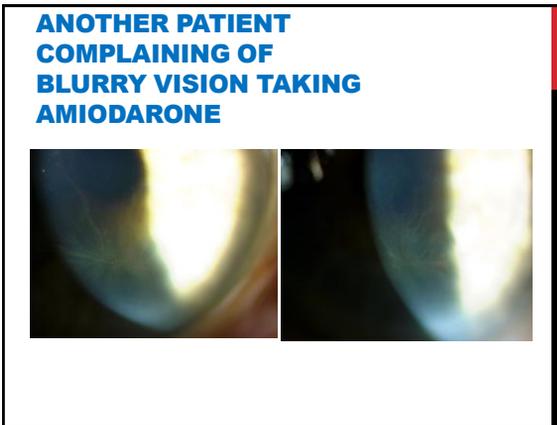
AMIODARONE OCULAR SIDE EFFECTS

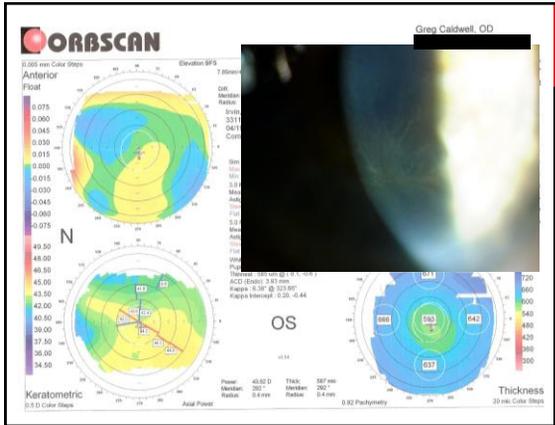
- Halos and colored lights, reported symptoms
- Corneal opacities
 - Epithelial basal cell layer
 - Bilateral, dose and duration related
 - Reversible
 - Dot, Linear, cornea verticillata (whorl like pattern found later)
- Conjunctiva, lens, retina and optic nerve deposits
- Optic neuropathy has been reported
 - Unilateral and bilateral cases

<http://www.optometry.co.uk/articles/20020517/patel20020517.pdf>

CORNEA VERTICILLATA (WHORLS)

- Drug-induced
 - Amiodarone
 - Chloroquine/hydroxychloroquine
 - Tamoxifen
 - Chlorpromazine
 - Indomethacin
 - Rhopressa

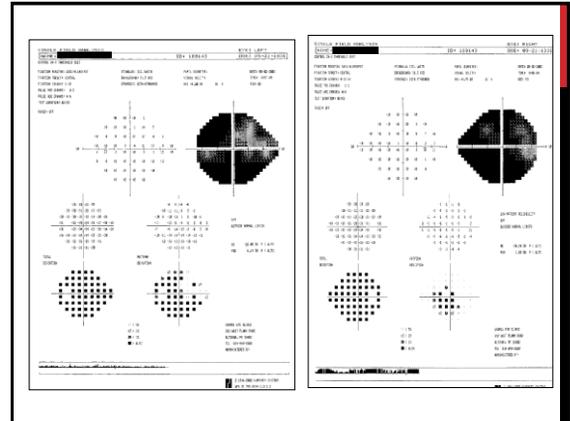




**THIS IS A NEURO COURSE
WHY ARE WE TALKING
ABOUT AMIODARONE?**

67 YEAR OLD MAN COMPLAINS OF VISION SLOWLY DETERIORATING OVER THE PAST 8 MONTHS

- History of NA-ION 10 months ago OD
- Patient sees family physician for physical due to recent NA-ION
 - Patient has not been to PCP for 35 years
 - Patient started Cardarone
 - VA 20/80 OD 20/25 OS (9 months ago)
- VA 20/400 OD 20/200 OS (today)
- CF: severe constriction OU
- SLE: vortex corneal whorls OU



AMIODARONE OPTIC NEUROPATHY

