Legends of the Posterior Segment

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Disclosures

Paid consultant for:
Alcon: Honoraria - Speakers Bureau
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Optovue: Honoraria - Speakers Bureau
Shire: Honoraria - Advisory Board/Speakers Bureau

CASE 1

Case History

- 38 black male, complaining that the vision in his right eye is blurry.
  - Got the current Rx 3 weeks previously, and started out good but in last couple of days OD vision has become blurry
- Medical Hx: no current health concerns and no medications

Entrance Skills

- Va’s: OD: 20/25, OS: 20/20
- Pupils: PERRL
- CVF: full to finger count
- EOM’s: FROM
- Amsler: central metamorphopsia OD
- HVF: 10-2 (see VF)
Central Serous Retinopathy

- an exudative chorioretinopathy characterized by an exudative neurosensory retinal detachment with or without an associated detachment of the retinal pigment epithelium (RPE)
- Patients experience blurry vision, metamorphopsia and micropsia
- individuals between 20 and 50 years of age

Central Serous Retinopathy

- incidence in men vs women is approximately 6 to 1
- associated with stress and stress hormones (ie, corticosteroids and epinephrine);
- individuals with a "type A personality" who are under stress
- recurrence in the ipsilateral eye is approximately 30% and CSR in the fellow eye was 32%

Central Serous Retinopathy vs RD


http://www.octscans.com/retinal-detachment.html

Central Serous Retinopathy

- 80% to 90% of cases resolve spontaneously within 3 months
- Treatment options:
  - include laser photoagulation,
  - "safety-enhanced" PDT,
  - Acetazolamide reduced the time for subjective and objective CSR resolution, but it had no effect on final VA or recurrence rate. Most patients in the experimental group in that study had side effects from the acetazolamide, including paresthesias, nervousness, and gastric upset
Central Serous Retinopathy

• Treatment options:
  – Topical NSAIDs:
    • Conflicting reports
    • Michael Singer, MD, from Medical Center Ophthalmology in San Antonio reported an increase in resolution time by 50%
    • PRADEEP VENKATESH, MD reports that NSAIDS treatment could possibly slow down or cause a rebound CSR

CHRPE vs Nevus

NEVI TRIVIA

• 31% of choroidal nevi show slight enlargement over time without the transformation to a melanoma (Ophthalmology 2011)
• The prevalence of choroidal nevi in the white U.S. population ranges from 4.6% to 7.9%
  – If it is assumed that all choroidal melanomas arise from preexisting nevi, then the published data suggest a low rate (1/8845) of malignant transformation of a choroidal nevus in the U.S. white population. (Ophthalmology 2005)
• Choroidal melanoma risk for metastasis, ranging from 16% to 53% (at 5 years of follow-up) depending on the size of the tumor at the time of diagnosis. (Arch Ophthalmol 1992)

TFSOM—“To Find Small Ocular Melanoma”

Thickness: lesions >2mm
Fluid: any subretinal fluid (suggestive of serous retinal detachment)
Symptoms: photopsia, vision loss
Orange pigment overlying the lesion
Margin touching optic nerve head (<3mm)

• None of these factors = 3% risk of a nevus converting to melanoma in five years.
  One or these factors = 8% risk of conversion in five years. Two or more factors = 50% risk of conversion in five years. For any changes noted during the course of follow-up, refer the patient to a retinal practice or an ocular oncology service.

TFSOM-UHHD:
“To Find Small Ocular Melanoma Using Helpful Hints Daily”

Thickness: lesions >2mm
Fluid: subretinal fluid
Symptoms: photopsia, vision loss
Orange pigment overlying the lesion
Margin touching optic nerve head (<3mm)
Ultrasound Hollowness
Halo absence
Drusen absence

• Choroidal nevi showing no features should be initially monitored twice yearly and followed up annually.
• 1 or 2 features should be monitored every 4 to 6 months.
• Nevi with 3 or more features should be evaluated at an experienced center for management alternatives and possible treatment owing to the high risk of ultimate growth.
Case

- 65 yr old white male
  - Notices spot in vision in his left eye
  - Diabetes for 15 years
- Vision: 20/20 (6/6) and 20/40 (6/12)
- Dilated exam:
  - Large lesion noted in left eye (not noted in exam 6 months previously)
  - See photo and B-scan

Choroidal Melanoma Metastases

- 80 to 90% of metastases from uveal melanoma occurred in the liver, less common sites being the skin and lung.

Ocular Tumors

- Astrocytic Hamartoma
- Amelanotic Melanoma
- Retinoblastoma
- Metastatic Choroidal Tumor

Melanoma and Mortality

- Tumor Size:
  - 5-year mortality after enucleation:
    - 16% for small melanoma,
    - 32% for medium melanoma,
    - 53% for large melanoma.
  - the prognostic importance of tumor size:
    - each 1-mm increase in melanoma thickness adds approximately 5% increased risk for metastatic disease at 10 years
- Tumor genetics:
  - Chromosome monosomy 3 (approx 50% of patients)
    - 50% of them develop metastasis within 5 years of diagnosis
    - 70% mortality within 4 years of ocular treatment
    - one of the most important independent risk factors of poor survival
Case: Gonzalez

- 33 HF presents with a painful, red right eye
  - Started a couple of days ago, deep boring pain
  - Has tried Visine but hasn’t helped the redness
- PMHx: patient reports she has been diagnosed with rheumatoid arthritis 3 years ago
  - Takes Celebrex for the joint pain
  - Patient reports she occasionally gets a skin rash when she is outdoors in the sun
- POHx: unremarkable
- PMHx: mother has rheumatoid arthritis

Etiologies of Cotton Wool Spots

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Vascular Ocular Disease</th>
<th>Hypertension</th>
<th>Ocular Ischemic Syndrome</th>
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</thead>
<tbody>
<tr>
<td>Autoimmune Disease e.g. SLE</td>
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<tr>
<td>Hyperviscosity syndromes</td>
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<tr>
<td>Trauma</td>
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<tr>
<td>Preeclampsia</td>
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<td></td>
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<tr>
<td>Radiation Retinopathy</td>
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<tr>
<td>Toxic e.g. interferon</td>
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<td></td>
<td></td>
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<tr>
<td>Neoplastic e.g. leukemia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior Ischemic Syndrome</td>
<td></td>
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</tr>
<tr>
<td>Infectious e.g. HIV</td>
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Patient Update

- Patient was worked up for lupus and diagnosed with lupus.
- Patient was already taking Celebrex which was not effective in treating the scleritis she presented with
  - upon referral to rheumatology it was discovered that she had several organs already being affected by the lupus
  - she was put on immunosuppressive agents to treat the systemic and ocular manifestations
- Patient was taken off of Celebrex and put on plaquenil (hydroxychloroquine) 400 mg po qd

Antimalarials

- Hydroxychloroquine (HCQ) more common and less toxic than more effective chloroquine
  - usual dose is 200-400 mg/d at night with onset of action after a period of 2-4 months
- has mild DMARD effect, does not slow radiographic progression and has relatively slow onset of action, useful with other DMARD’s
Antimalarial Ocular Complications

- Have affinity for pigmented structures such as iris, choroid and RPE
- Toxic affect on the RPE and photoreceptors leading to rod and cone loss.
- Have slow excretion rate out of body with toxicity and functional loss continuing to occur despite drug discontinuation.

Antimalarial Ocular Complications

- Toxicity can lead to whorl keratopathy, “bulls eye” maculopathy, retinal vessel attenuation, and optic disc pallor.
- Early stages of maculopathy are seen as mild stippling or mottling and reversible loss of foveal light reflex
- “Classic” maculopathy is in form of a “bulls eye” and is seen in later stages of toxicity
  - this is an irreversible damage to the retina despite discontinuation of medication

Antimalarials

Bulls Eye Maculopathy  Whorl Keratopathy

“New” New Recommendations

- Recommendations on Screening for Chloroquine and Hydroxychloroquine Retinopathy – Ophthalmology 2016; 123:1386-1394
  - Released March 2016 from American Academy of Ophthalmology
  - revised in light of new information about the prevalence of toxicity, risk factors, fundus distribution, and effectiveness of screening tools.

Revised Recommendations on Screening for Retinopathy

- 2002 recommendations for screening were published by Ophthalmology
- Revised recommendations on screening published in Ophthalmology 2011;118:415-42
  - Significant changes in light of new data on the prevalence of retinal toxicity and sensitivity of new diagnostic techniques
  - Risk of toxicity after years of use is higher than previously believed
    - Risk of toxicity approaches 1% for patients who exceed 5 years of exposure

2016 Recommendations

- maximum daily HCQ use of 5.0 mg/kg real weight, which correlates better with risk than ideal weight.
- risk of toxicity is dependent on daily dose and duration of use.
  - at recommended doses:
    - risk of toxicity up to 5 years is under 1%
    - up to 10 years is under 2%
    - rises to almost 20% after 20 years. However, even after 20 years, a patient without toxicity has only a 4% risk of converting in the subsequent year.
2016 Recommendations

- High dose and long duration of use are the most significant risks.
  - Other major factors are concomitant renal disease, or use of tamoxifen
- A baseline fundus examination should be performed to rule out preexisting maculopathy.
- Begin annual screening after 5 years for patients on acceptable doses and without major risk factors.

2016 Recommendations

- primary screening tests are automated visual fields plus spectral-domain optical coherence tomography (SD OCT)
- most patients of Asian descent will show initial damage in a more peripheral extramacular distribution near the arcades (require a 24-2 as opposed to 10-2 and OCT scans need to be analyzed further out)

Revised Recommendations on Screening for Retinopathy

- Parafoveal loss of visual sensitivity may appear before changes are seen on fundus evaluation
  - Many instances where retinopathy was unrecognized for years as field changes were dismissed as “non-specific” until the damage was severe
  - 10-2 VF should always be repeated promptly when central or parafoveal changes are observed to determine if they are repeatable
  - Advanced toxicity shows well-developed paracentral scotoma

Normal Retina: VF/OCT/ERG

Paracentral Scotomas
Mild Maculopathy

- Normal Foveal Peak
- Thinned Outer Nuclear Layer
- Paracentral Scotomas

Bull’s Eye Maculopathy

- Flattened Foveal Peak
- Dense Para/Central Defects
- Remnant of PIL
- RPE Atrophy

Major Risk Factors

Table 1. Major Risk Factors for Toxic Retinopathy

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily dosage</td>
<td>&gt;5.0 mg/kg real weight</td>
</tr>
<tr>
<td>CQ</td>
<td>&gt;2.3 mg/kg real weight</td>
</tr>
<tr>
<td>Duration of use</td>
<td>&gt;5 yrs, assuming no other risk factors</td>
</tr>
<tr>
<td>Renal disease</td>
<td>Subnormal glomerular filtration rate</td>
</tr>
<tr>
<td>Concomitant drugs</td>
<td>Tamoxifen use</td>
</tr>
<tr>
<td>Macular disease</td>
<td>May affect screening and susceptibility to HCQ/CQ</td>
</tr>
</tbody>
</table>

CQ = chloroquine; HCQ = hydroxychloroquine.

Screening Recommendations

Table 2. Screening Frequency

<table>
<thead>
<tr>
<th>Screening Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Fundus examination within first year of use</td>
</tr>
<tr>
<td></td>
<td>Add visual fields and SD OCT if maculopathy is present</td>
</tr>
<tr>
<td>Annual</td>
<td>Begins after 5 yrs of use</td>
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<tr>
<td></td>
<td>Sooner in the presence of major risk factors</td>
</tr>
</tbody>
</table>

SD OCT = spectral-domain optical coherence tomography.
Case

- 50 YR WM
- POHx: had cataract surgery in his left eye at age 25 secondary to trauma to the eye,
  - Has a mid-dilated pupil post trauma
- PMHx: no known health problems and no medications
- VA: 6/6 (20/20) OD, OS

Health Assessment

- SLE:
  - OD unremarkable
  - OS: mid-dilated pupil with sluggish response to light
  - PCIOL well centered and no haze
- IOP: OD 12 and OS 26 mm Hg (TAG)
  - NCT OS (31 and 23)
  - Second visit: OD: 13 and OS: 27

Health Assessment

- Gonioscopy:
  - OD: unremarkable
  - OS: see photo

Optic Nerves

Visual Fields

Ganglion Cell Analysis
Macular hole

- **Stages**
  - Stage 1a -> impending hole. Normal foveal depression with yellow spot/dot in fovea.
  - Stage 1b -> Abnormal foveal depression with yellow ring.

New Macular Hole Staging

<table>
<thead>
<tr>
<th>Stage</th>
<th>Clinical Description</th>
<th>VMTS Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>No macular hole</td>
<td>VHVA</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Pre-peripheral macular hole</td>
<td>VHVA</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Peripheral macular hole</td>
<td>VHVA</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Full-thickness hole w/ cuff of SRF, No PVD</td>
<td>VHVA</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Full-thickness hole w/ cuff of SRF, with complete PVD</td>
<td>VHVA</td>
</tr>
</tbody>
</table>

Macular hole

- **Stages**
  - Stage 2 -> Small full-thickness hole. 20/80 - 20/400.
  - Stage 3 -> Full-thickness hole w/ cuff of SRF. No PVD
  - Stage 4 -> Full-thickness hole with cuff of SRF, with complete PVD.

RNFL and ONH Analysis

- **Unilateral, decreased vision**
  - Often in 60-80 year old women
  - Anyone w/ a history of trauma

- **Symptoms:**
  - Decreased vision, metamorphopsia
    - 20/200 for full thickness holes

- **Signs:**
  - Red hole in the macula
    - (+) Watzke-Allen sign

Macular hole

- **Stages**
  - Stage 2a -> impending hole. Normal foveal depression with yellow spot/dot in fovea.
  - Stage 2b -> Abnormal foveal depression with yellow ring.
New Macular Hole Staging

Table 2: Correlation between Commonly Used Clinical Macular Hole Stages and the International Vitreomacular Traction Study Classification System for Vitreomacular Adherence, Traction, and Macular Hole

<table>
<thead>
<tr>
<th>Full/Thickness Macular Hole Stages in Common Use</th>
<th>International Vitreomacular Traction Study Classification System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0:</td>
<td>VMA</td>
</tr>
<tr>
<td>Stage 1:</td>
<td>Medium or large FTMH with VMT</td>
</tr>
<tr>
<td>Stage 2:</td>
<td>Small or medium FTMH with VMT</td>
</tr>
<tr>
<td>Stage 3:</td>
<td>Small FTMH without VMT</td>
</tr>
</tbody>
</table>

Small FTMH w/o traction

- 154 microns
- 237 microns

Medium FTMH w/o traction

- 250-400 microns

Large FTMH with traction

- > 400 microns

Case

- 65 year old Caucasian patient presents with sudden onset loss/blurring of vision in the right eye
- PMHx: HTN for 15 years, takes “water pill”
- VA’s: 20/60 OD, 20/25 OS
- Pupils: PERRL – APD
- CVF: Inferior defect right eye, no defects noted in the left eye
Vision Loss Without Pain: Diabetes/Diabetic Retinopathy

- Microvascular complications resulting in capillary closure & abnormal permeability
- S&S include:
  - blurring of vision (maculopathy and refractive error shifts),
  - sudden drop in vision (vitreous heme),
  - dot and blot hemes,
  - exudate,
  - cotton wool spots,
  - neovascularization (iris, retina and disc)

Diabetic Retinopathy

- CSME (DME) OCTA

VEGF and DME

Vision Loss Without Pain: Vein Occlusion

- Associated with:
  - hypertension,
  - coronary artery disease,
  - DM and peripheral vascular disease.
- Usually seen in elderly patients (60-70), slight male and hyperopic predilection.
- Second most common vascular disease after diabetic retinopathy.

Branch Retinal Vein Occlusion: Signs/Symptoms

- BRVO: sudden, painless, visual field defect.
  - patients may have normal vision.
  - quadrantic VF defect,
  - dilated tortuous retinal veins with superficial hemes and CWS
  - typically occurs at A/V crossing (sup/temp)

BRVO

- BRVO more common than CRVO and has more favorable prognosis
  - Overall 50-60% of BRVO patients will maintain VA of 20/40 or better
- Visual loss results from:
  - Macular edema
  - Foveal hemorrhage
  - Vitreous heme
  - Epiretinal membrane
  - RD
  - Macular ischemia
  - Neovascularization complications
Central Retinal Vein Occlusion

- Visual morbidity and blindness are primarily from:
  - persistent macular edema,
  - macular ischemia and
  - neovascular glaucoma

Central Retinal Vein Occlusion

- CRVO’s can be ischemic or non.
  - Classical definition of ischemic is 10-disc area of non-perfusion found on angiography
  - RAPD and ERG maybe better predictor
  - VA’s typically worse in ischemic
  - Increased number of cotton wool spots with decreased VA maybe predictive
Central Retinal Vein Occlusion

- Ischemic CRVO may lead to iris neovascularization and neovascular glaucoma
  - Estimated approx 20% of CRVO’s are ischemic with 45% of those developing neo
- Regular examinations (1-2 wks) to monitor for ischemia or neo development
  - should include gonio as angle neo can precede iris rubecosis

**Study Design CRUISE (n=392)**

- **Randomization**
  - Sham (n=130)
  - 0.3 mg Ranibizumab (n=132)
  - 0.5 mg Ranibizumab (n=130)

- Monthly injections (last at 5M):
  - Mean Change from Baseline BCVA
  - **CRVO**
    - Day 0/Month 5: Mean Change from Baseline BCVA
      - 0.5 mg Ranibizumab (n=130)
        - Mean Change from Baseline BCVA: +14.9 *
      - 0.3 mg Ranibizumab (n=132)
        - Mean Change from Baseline BCVA: +12.7 *
      - Sham (n=130)
        - Mean Change from Baseline BCVA: +0.8

- **Primary Endpoint**
  - Macular Edema Secondary to CRVO

- **Monthly Treatment**
  - Months 6–11
  - PRN Treatment

**Vision Loss Without Pain: Artery Occlusion**

- Primarily embolic in nature from cholesterol, calcifications, plaques.
- Usually occurs in elderly associated with:
  - hypertension (67%),
  - carotid occlusive disease (25%),
  - DM (33%) and cardiac valvular disease.
- Sudden loss of unilateral, painless vision
  - defect dependent upon location of occlusion

**Vision Loss Without Pain: Artery Occlusion**

- BRAO typically located in temporal retinal bifurcations.

**CRAO**

- CRAO has profound vision loss with history of amaurosis fugax.
  - Vision is usually CF (count fingers) to LP (light perception) with positive APD.
  - Diffuse retinal whitening with arteriole constriction, cherry red macula.
Ophthalmic Emergency

- Treatment is controversial due to poor prognosis and questionable benefit.
- Treat immediately before workup, if patient presents within 24 hours of visual loss:
  - Digital ocular massage,
  - Systemic acetazolamide (500 mg IV or po),
  - Topical ocular hypertensive drops (Iopidine, B-blocker),
  - Anterior chamber paracentesis,
  - Consider admission to hospital for carbogen Tx (high carbon dioxide)

Case 6

13 YR Female

Entrance Skills

- VA with current Rx: 20/30 OD and 20/30 OS
- Entrance skills unremarkable
- Amsler: metamorphopsia OS
- BCVA: 20/20 OD with increased minus, no improvement possible in the left eye
- IOPs: 13 mm Hg OD and OS

Fundus Photos

OCT
Retina Consult

- Referred patient to retina and they confirmed the diagnosis of VKH.
- She was begun on oral prednisone 60 mg per day and she was re-evaluated in 1 week.
- At the follow up, there was reduction in her serous retinopathy and vision was improved.

From the Experts

- Vogt-Koyanagi-Harada (VKH) disease is a multisystemic disorder characterized by granulomatous panuveitis with exudative retinal detachments that is often associated with neurologic and cutaneous manifestations.
- VKH disease occurs more commonly in patients with a genetic predisposition to the disease, including those from Asian, Middle Eastern, Hispanic, and Native American populations.

From the Experts

- VKH:
  - Patients have no prior history of ocular trauma or surgery
  - Patients have no evidence of another ocular disease based on clinical or laboratory evidence
  - Patients have bilateral ocular involvement.

From the Experts

- VKH:
  - The neurologic and auditory signs include the following:
    - Malaise, fever, headache, nausea, abdominal pain, stiffness of the neck and back, or a combination of these factors; headache alone is not sufficient to meet the definition of meningitis
    - Tinnitus
    - Cerebrospinal fluid pleocytosis
  - Integumentary signs include the following:
    - Alopecia: loss of body hair
    - Poliosis: loss of pigment in hair
    - Vitiligo: loss of skin pigmentation in blotchy pattern

VKH Treatment

- For most patients with bilateral serous detachments and severe visual loss, begin therapy with systemic prednisone (1-2 mg/kg/day).
- The length of treatment and subsequent taper must be individualized for each patient.
  - Most patients require therapy for 6 months and occasionally up to 1 year before successful tapering of systemic corticosteroids.
  - Systemic therapy should not be discontinued during the 3 months following the onset of the disease because of the risk for recurrence.