Ophthalmology Grand Rounds

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December 15, 2011
History

- 60 year old Caucasian woman presents with blurry vision x 20 years OU. No acute change. Happy with near vision. States that she has worn glasses since she was a young child.

- Denies pain, photophobia, HA, diplopia
- Denies metamorphopsia, photopsia, blockages in vision
History

• PMHx: CVA with residual left hemiparesis 2004, DM, HTN, HL
• POHx: “Glasses since I was a child”
• Gtts: none
• FHx: denies glaucoma/blindness
• Social: denies EtOH, smoking, drugs
• All: NKDA
Examination

• dVAcc: 20/30 PH NI, 20/40-1 PH NI OS
• EOM: Full OU, no diplopia or pain in any gaze
• P: 5→3 OU, no APD OU
• cVF: Full OU
• Tapp: 15 OD, 16 OS @ 10:00 AM

• Amsler Grid: WNL OU
Examination

SLE
LLA: WNL OU
C/S: white and quiet OU
K: Tr SPK OU
AC: Deep and Quiet OU
P/I: round/reactive OU, no NVI OU
L: 1+ NS OU, Tr PSC OS
Dilated Examination
Fluorescein Angiogram

(Kim, YM et al. *Eye*, 2011)
Dilated Examination

- Vitreous: clear OU; no vitritis OU
- C/D:
  - OD: 0.3, sharp, tilted, peripapillary atrophy
  - OS: 0.3, sharp, tilted, myopic crescent
- Macular: flat OD; flat OS, Hyperpigmented spot foveal center OD
- Vessels:
  - OU: WNL
- Periphery: Tigroid fundus OU
Differential Diagnosis

60 yo F c/o progressive, chronic blurry vision with Tigroid fundus, PPA OU, and macular choroidal neovascularization OD

- Degenerative Myopia
- Presumed Ocular Histoplasmosis Syndrome (POHS)
- Age-Related Macular Degeneration
- Staphyloma
- Angioid streaks
- Gyrate Atrophy
- Choroideremia
- Polypoidal choroidal vasculopathy

Medical Knowledge
Presumed Ocular Histoplasmosis Syndrome

Right: Macular grey-green CNV, PPA
Left: Classic POHS, punched out histo-spots, pigmented PPA
Presumed Ocular Histoplasmosis Syndrome

- **Fungi**, *Histoplasma capsulatum*, endemic in Ohio and Mississippi River Valley
- asymptomatic, unless + CNV → get metamorphopsia, central scotoma, 60% bilateral, immunocompetent

**Signs:**
- Punched out chorioretinal “histo spots”
- PPA with pigment separating disc
- No vitritis

**Treatment**
- Antifungal not indicated
- Management of CNV: PDT vs Anti-VEGF vs Laser
Choroideremia

- X-linked recessive, Rod-cone dystrophy
- M>>F, presents in 1st-2nd decade of life, slow progression
- Presents with Nyctalopia, and progressive VF deficit

Fundus: Dispersed pigment granules, peripapillary RPE atrophy → total RPE and choriocapillaris loss

- Normal color vision, abnormal ERG
- FA: scalloped hypofluorescence adjacent to bright hyperfluorescence
- No Treatment
**Angioid Streaks**

- Breaks in a thickened or calcified Bruch’s membrane, reddish-brown curvilinear, radiations from ON sub-retinal

- 50% associated with systemic disease, most commonly: Pseudoxanthoma elasticum, Ehlers-Danlos, Paget’s and SS Disease, (mnemonic: **PEPSI**)

- Asymptomatic, unless CNV develop

**Signs**

- Peau d’orange, ON drusen, histo-like spots

**Treatment**

- NONE, unless CMV develop
- Polycarbonate lenses

**Medical Knowledge**

FA: granular early phase hyperfluorescence
Gyrate Atrophy

- Well demarcated, lobulated areas of chorioretinal atrophy

http://disorders.eyes.arizona.edu/disorders/gyrate-atrophy-0  MEDICAL KNOWLEDGE
Gyrate Atrophy

- Autosomal Recessive
- Mutation in gene for ornithine aminotransferase (OAT) → 10x [plasma] ornithine, which is toxic to retina
- Presents 1st-2nd decade with night blindness and VF deficit
- Hyperpigmented fundus with lobulated RPE atrophy in midperiphery
- Measure ornithine levels

Treatment
- Vitamin B6, restrict Arginine

http://disorders.eyes.arizona.edu/disorders/gyrate-atrophy-0
Back to our patient…

Mrx:
OD: -10.25 x -3.25 x 160 (20/40)
OS: -11.50 x -1.75 x 155 (20/60)
Degenerative Myopia

- **Definition:**
  - High Myopia: spherical equivalence greater than -6.00 D, axial length > 26-27 mm
  - Degenerative Myopia: usually > -8.00 D, axial length >32.5mm

- **Epidemiology:**
  - 7th leading cause of blindness in USA, 2% of general population
  - Of myopic population, 6 to 18% progress to high myopia
  - Higher incidence in Asians, Mediterranean, less likely in African Americans
Progressive elongation of axial diameter leads to thinning of RPE, choroid, sclera and deviation of the optic nerve.

- Biomechanical thinning → stromal and vascular obliteration → metabolic disturbance → retinal/RPE degeneration and neovascularization

- Genetics: nine Autosomal Dominant loci have been identified

- Associated with Ehler Danlos, Noonans, Downs, Marfans Syndromes
Clinical Presentation

Symptoms

- Asymptomatic
- Blurry vision...Myopia
- Metamorphopsias
- Photopsias
- Scotoma
Fundus Manifestations

- Tilted optic disc
- Peripapillary atrophy
- Lacquer Cracks
- Subretinal, macular heme
- Forster-Fuchs spots

- Posterior Staphyloma
- Lobular RPE Atrophy
- Lattice Degeneration
- Cobblestone Degeneration
- Choroidal Neovascularization
Lacquer Cracks

- rupture of Elastic lamina of Bruch’s membrane

- Foreshadows subretinal heme and CNV

Malagola et al, 2006
Medical Knowledge
Lacquer Cracks vs Angioid Streaks vs Choroidal Rupture

- All three diseased states of Bruch’s membrane

- Angioid streaks emanate radially from disc, are straighter, and are reddish in color.

- Choroidal ruptures, similar distribution, color, and fluorescein angiographic appearance to LC, but are caused by a traumatic event.
Fuch’s Spot

- Hyperpigmented spot due to subretinal or intraretinal RPE hyperplasia in response to a small CNV that does not regress, or from resolved micro-hemorrhage

Medical Knowledge
Posterior Staphyloma
Lattice vs Paving Stone Degeneration

Paving Stone: protective Risk Factor for RD
Diagnosis

- Clinical
- FA—if CNV suspected
  - Classification of myopic CNV—90% “classic”
    - Type I: early hyperfluorescence without late leakage
    - Type II: early hyperfluorescence with late leakage
- ICG (less sensitive for CNV Identification)
- +/- OCT
Complications

- Retinal Detachment--Rhegmatogenous
- Choroidal Neovascularization
  - 5-10% develop with axial length > 26.5 mm
  - 89% subfoveal (Secretan et al. 1997)
  - Majority progress to <20/200 within 5-10 years
- Retinal Tears
- Retinal or Choroidal Hemorrhage
- Chorioretinal Atrophy
Treatment

- Not as studied as CNV related to wet ARMD
- Laser-thermal photocoagulation (extrafoveal)
- Photodynamic Therapy with verteporfin (sub/juxtafoveal)
- Anti-VEGF (sub/juxtafoveal ?)
- Polycarbonate Lens given increased risk of rupture from minor trauma
Objective: To determine if PDT with Verteporfin improves or stabilizes VA in patients with subfoveal CNV from pathologic myopia

Methods: Prospective, multi-center, placebo controlled, randomized study of 120 patients with VA > 20/100, and CNV < 5.4mm in diameter
Photodynamic Therapy of Subfoveal Choroidal Neovascularization in Pathologic Myopia with Verteporfin

1-Year Results of a Randomized Clinical Trial—VIP Report No. 1

Verteporfin in Photodynamic Therapy (VIP) Study Group

- Results: At 1 year: 77% of treated vs 44 % placebo lost fewer than 8 letters (p<0.01), 32% vs 15% improving > 1 line

- Conclusion: PDT with Verteporfin can safely increase chances of stabilizing or improving VA from pathologic subfoveal CNV

- Similar results on 1, 2, and 5 year follow-up (VIP1-3)

- Later studies +/- use of IV Kenalog (Marticorena J et al 2006)
Purpose: To Assess effect of IV bevacizumab on CMV in pathological myopia using FA and VA

Methods: Prospective, non-controlled, non-randomized 63 eyes, received 1mg of IVB, with avg 2.4 injections during first year. Subfoveal (43%), juxtafoveal (49%), extrafoveal (8%)

Results: BCVA improved 3 ETDRS lines in 40%, worsened > 3 lines in 5%, unchanged in 56% (P<0.01). FA leakage ceased in 48%, diminished in 44%, unchanged in 8%. No chorioretinal atrophy

Conclusion: IVB is effective Tx for myopic CNV
The Future of Treatment

- **Anti-VEGF vs PDT**
  - More prospective, double blind, placebo controlled studies needed

- **VEGF-Trap**

- **For now...** Laser has a questionable role for extrafoveal CNV associated with pathologic myopia given propensity for chorioretinal atrophy
Conclusions and Key Points

- High Myopia = sph equivalence > -6.00 D, axial length > 26-27 mm
- Signs: Lacquer Cracks, Myopic Crescent, PPA, Fuch’s Spot, CNV, lattice degeneration, retinal detachment and tears
- DDx: POHS, ARMD, Angioid Streaks, choroideremia, gyrate atrophy
- Dreaded Complication: CNV
- Tx: PDT with verteporfin (FDA approved)
  - Anti-VEGF (off-label)
Core Competencies

**Patient Care**: The patient received compassionate care, based on the appropriate and most effective management techniques that addressed her physical, emotional, and mental health issues.

**Medical Knowledge**: The literature was reviewed, a differential was formed. Diagnostic and therapeutic modalities were discussed using evidence-based medicine and general practice guidelines. The basic and clinical science of the disease was reviewed to better understand this condition.

**Practice-Based Learning and Improvement**: The literature was reviewed, as was the full. The clinical evidence was assimilated to better treat the patient as well as learn from her clinical course in order to manage patients in the future.

**Interpersonal and Communication Skills**: We communicated extensively with the patient regarding the process of diagnosing and treating her disease. All of her questions were answered in a compassionate manner. We worked as a team to limit her fears of vision loss.

**Professionalism**: Our responsibility as a physician to do no harm was adhered to at all times. Necessary tests were suggested and the ethical principles of informed consent were utilized. The patient’s clinical information remained confidential at all times.

**Systems-Based Practice**: We showed awareness of the healthcare system, using cost-effective mechanisms of diagnosis and management. We worked with the optometrists to better to best correct the patient’s visual acuity.
Reflective Practice

This case demonstrated a classic presentation of an uncommon disease process. After considering a wide differential diagnosis and examining the literature, the appropriate diagnostic modalities were chosen to narrow our differential and formulate a diagnosis. The patient was appropriately and compassionately managed. Understandably, she was quite concerned regarding her visual prognosis. She was educated about her disease process and its natural course. We worked closely with the optometrists to improve the patient’s vision as best as we could.


Thank You!

- Dr. Scott
- Dr. Shrier
- KCHC Faculty, Staff, and Residents