“Doc, I See a Donut in My Vision”: An Optometrist’s Guide to a Rare Cause of Choroidal Neovascular Membrane

Linda Pham, OD, Tobin Ansel, OD, Nancy Shenouda-Awad, OD, FAAO, West Haven VA Medical Center

Abstract

Choroidal neovascular membrane (CNVM) caused by anything other than ARMD can be challenging to manage. This case illustrates an atypical cause of CNVM in a patient with macular chorioretinal scars. Differentials and treatment are discussed.

I. Case History
   a. 62 year old white male
      i. Chief Complaint: “I see a greyish donut in my vision” and decreased vision OD
      ii. Onset: 4 days prior to exam
      iii. Patient reports that steam went into his eyes when he opened the oven door and that is when he noticed his vision OD was blurry
      iv. Patient denied pain or redness. History of floaters OU, longstanding without changes. No flashes of light
   b. Ocular History:
      i. Toxplasmosis scars OS>>OD, longstanding
      ii. Ocular hypertension OU w/ large cupping OU
      iii. Presbyopia
   c. Medical History:
      i. Alcohol, Nicotaine, and Cocaine Dependence
      ii. Chronic Hepatitis C
      iii. Cervical Radiculopathy
   d. Medications:
      i. None
   e. Other: Current smoker, 1 pack per day x 45 years

II. Pertinent Findings:
   a. Clinical:
i. BCVA: OD 20/200+2 PH NI, OS 20/200 PH NI (Previously, OD 20/20-2, OS 20/400 in 2013)
   1. Patient reported having to look up to see out of OD; No improvement with refraction

ii. Pupils: OD brisk reaction to light, OS trace APD

iii. IOP: OD 24 mmHg OS 23 mmHg

iv. Posterior segment:
   1. C/D ratio: OD 0.70H/0.65V OS 0.70H/0.70V deep cupping OU; larger overall discs
   2. Macula: OD 1.5 x 1.5 DD sub-retinal/sub-retinal pigment epithelium (RPE) hemorrhage with 2 areas of pigment epithelial detachments (PED) within the heme; OS 2 x 2 DD disciform scar showing underlying sclera with some RPE migration and pigment clumping (longstanding)
   3. Posterior Pole: OS small 1/3x1/3DD chorioretinal scar nasal to ONH
   4. Periphery: Flat, intact 360 OU without holes/tears/detachments

b. Imaging:
   i. OCT:
      1. OD: fibrovascular PED and serous PED with sub-retinal and sub-RPE fluid, indicating serous retinal detachment
      2. OS: extensive atrophy of outer retinal layers
   ii. FA:
      1. OD: large area of hypo-fluorescence over macula at location of macular hemorrhage, in addition to overlying area of hyperfluorescence from leakage
      2. OS: 2x2 DD window defect with demarcated borders. No apparent leakage

III. Differential causes of CNVM:
   a. Primary:
      i. Presumed Ocular Histoplasmosis Syndrome (POHS)
   b. Secondary:
      i. Toxoplasmosis
ii. Ocular Toxocariasis

iii. Age-Related Macular Degeneration (ARMD)

iv. Adult-Onset Vitelliform Macular Dystrophy

IV. Diagnosis and Discussion

a. Based on the clinical presentation, blood work-up, and diagnostic testing, the final diagnosis was CNVM due to POHS. *Histoplasma capsulatum* is a dimorphic fungus found in temperate climates throughout the world but is endemic to the Ohio, Missouri, and Mississippi River valleys, or the “Histo Belt” in the United States. Dissemination of *Histoplasma capsulatum* in the choroidal circulation is thought to cause a subclinical choroiditis and likely the reason why patients with POHS do not seek care until they develop foveal-compromising choroidal neovascularization causing acute or gradual painless progressive central vision loss. The ocular manifestations of POHS include the triad of: atrophic chorioretinal scars or “punched-out” lesions, peripapillary atrophy, and maculopathy without the presence of vitritis.

b. The patient’s macular findings were previously stated to be due to Toxoplamosis. Acute, new and/or active lesions associated with Ocular Toxoplamosis are intensely white, focal lesions with overlying vitreous inflammatory haze. Active lesions with a vitreous inflammatory reaction will have the classic “headlights in a fog” appearance. Old and inactive lesions are typically hyperpigmented scars with “satellite lesions” (smaller circular lesions) at its border. Upon evaluation of old and current Optical Coherence Tomography (OCT) scans and fundus photographs; the retinal presentation did not match the characteristics of Toxoplamosis but more that of POHS. Additionally, the patient tested negative for serum Toxoplasma antibodies in 1994.

c. Although the patient reported on his follow-up visit that he worked at an animal hospital in his teens and had been bitten by a sick canine, the patient’s fundus appearance did not match that of Ocular Toxocariasis (OT). OT is caused by the migration of Toxocara larvae into the eye, is typically unilateral, and presents with a retinal granuloma, a yellow/white area of inflammation, in the posterior pole or the peripheral retina. The patient tested negative for serum Toxocara antibodies in 1994.

d. Although CNVM secondary to POHS and neovascular ARMD are generally treated similarly, with anti-VEGF, this patient did not have ARMD. The patient first reported decreased vision OS in 1994, about 22 years prior to this exam when he was in his early
40’s. Generally, those who develop macular degeneration are at least 50 years of age. Additionally, this patient’s macular scarring cannot be easily confused with ARMD.

e. Electrophysiological testing, such as an electroretinogram (ERG) or multifocal electroretinogram (MF-ERG), was not done on this patient. Though, it is unlikely that his condition is due to a macular dystrophy, because the patient’s clinical appearance of scarring OS did not match the classic appearance of Adult-onset vitelliform macular dystrophy, even though the onset of the patient’s symptoms falls into the appropriate age range.

f. In addition to the aforementioned, there are a few other causes of CNVM that were not clinically relevant. Some of these causes are: myopia, multiple evanescent white dot syndrome (MEWDS), punctate inner choroidopathy (PIC), birdshot chorioretinopathy, and trauma.

g. Severe vision loss in patients with POHS is choroidal neovascularization. Studies have shown that smoking increases the risk of development of CNVM by nearly 3 times compared to nonsmokers. This patient has been smoking 1 pack per day for 45 years, which significantly increased his chance of developing CNVM.

h. Patients with unilateral or asymmetrical macular disease, such as POHS, can and do show pupillary defects, though the pupillary defect would be less apparent than that of optic neuropathies. Thompson and Watzke reported that in a study with fourteen patients with unilateral or highly asymmetric macular disease due to POHS and a similar number of patients with ischemic optic neuropathy, the amount of the relative afferent pupillary defect of macular disease correlated with visual acuity, whereas in ischemic optic neuropathies it does not.

V. Treatment and Management:

a. Initial treatment for CNVM secondary to POHS is anti-vascular endothelial growth factor (Anti-VGEF) therapy. 85% of 28 eyes stabilized or improved in response to Avastin injections with 43% gaining 3 or more lines of vision. Eylea is advantageous in that it requires less-frequent dosing than Lucentis (Ranibizumab) and Avastin (Bevacizumab).

b. The prognosis of CNVM complications from POHS is dependent on location. Extrafoveal locations have a 44% 5-year risk of severe vision loss if not treated. Subfoveal locations have a 75% risk in vision decline to 20/200 or worse in 2-3 years if left untreated.
c. The patient received his first intravitreal injection of Eylea (Aflibercept) on the same day as his initial visit.

d. The patient returned 4 weeks later for his second injection of Eylea. At this visit, the patient’s uncorrected vision was 20/80 OD improved from 20/200+2 and 20/100 OS with eccentric viewing. On dilated fundus examination, the patient’s macular hemorrhage OD has significantly regressed with residual fibrosis. His macular OCT showed a fibrovascular PED and regressed serous PED with no sub-retinal fluid, which shows improvement from his previous scan.

e. He is due back in another month for his third intravitreal injection.

VI. Conclusion:

a. Histoplasmosis is endemic to the Ohio and Mississippi valley areas or the ‘Histo Belt.’ The patient exhibits the classic triad of POHS, which are atrophic chorioretinal scars or “punched-out” lesions, peripapillary atrophy, and maculopathy without the presence of vitritis. Additionally, the patient tested negative for Toxoplama and Toxocara serum antibodies in 1994.

b. Less than 5% of people with Histoplasmosis develop CNVM. However, smoking is a strong risk factor for developing CNVM in patients with POHS. Due to the patient being a long-time smoker, his risk was nearly 3 times more, compared to those that do not smoke.

c. Studies have shown that the risks of vision loss in the fellow eye are as follows: if there are no classical signs of POHS findings in the fellow eye, then there is a 1% risk of developing CNVM. If there is peripapillary atrophy, there is a 4% risk of vision loss to the fellow eye. For patients with focal macular Histoplasmosis spots, there is a 25% risk of CNVM to the fellow eye.

d. Anti-VGEF therapy is currently the gold standard treatment for CNVM secondary to POHS.

e. As an optometrist, it is important to properly identify and diagnose CNVM, identify its cause, and confirm with OCT and FA in order to manage the patient effectively.
Bibliography


