SALUS UNIVERSITY
The Eye Institute

Pennsylvania College of Optometry

The Focal Point

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Scholars Class of 2024

Hometown: Atlanta, Georgia
Undergrad: Georgia Institute of Technology
Major: Biology
Favorite Subject: Vision Science and Perception
Optometry Goal: to get axis spot-on during ret
Favorite cuisine: Persian food
Hobbies: cooking, practicing guitar, hiking
Last Show I binged: New Girl

Lauren White

Scholars Class of 2019, Pennsylvania College of Optometry

Hometown: Virginia Beach, Virginia
Undergrad: Old Dominion University
Major: Biological Sciences
Favorite Diagnostic Instrument: Autonomous Retinal Camera to talk about; OCT to interpret
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Hobby: going to the gym, contra dancing

An Eye Has It: Asymmetric Retinopathy and Ocular Ischemic Syndrome

Some details of the case have been changed to protect patient confidentiality. Though the NBEO PAM-Style format is utilized for the case write-up, there is no affiliation with NBEO.

Demographics

67-yo Black/AA male; retired, in assisted living facility for the last 7 months

Chief complaint: Annual diabetic eye exam; cloudy vision OU

History of present illness

Character/signs/symptoms: blurred vision at distance and near
Location: OU
Severity: moderate to severe
Nature of onset: longstanding, progressing since LEE 1 year prior
Duration/Frequency: chronic
Exacerbations/remissions: constant
Relationship to activity or function: none
Accompanying signs/symptoms: increased glare/halos especially at night, cloudiness of vision not resolved with glasses, no issues completing ADLs

Patient ocular history:

bilateral age-related cataracts OU
open angle with borderline findings OU
trauma from punch 30 yrs prior OS
(-) diabetic retinopathy

Family ocular history

mother: no known ocular history
father: no known ocular history

Patient medical history

Benign prostatic hypertrophy
Blood clots in both legs
IDDM2 (diagnosed 1 year prior, FBS on morning of exam: 117 mg/dL, La1c unknown)
Hypercholesterolemia
Hypertension
Gout
Chronic venous insufficiency
HIV (viral load undetectable)
Hepatitis C
Chronic Kidney Disease Stage 4

Medications taken by patient

Abacavir 300 mg, Allopurinol 300 mg, Amlodipine 2.5 mg, Banophen 25 mg, Furosemide 80 mg, Humalog Insulin 100 unit/mL, Lamivudine 100 mg, Oxycodone 5 mg, Pantoprazole 40 mg, Prednisone 50 mg, Prezcobix 800 mg, Santyl ointment 250 unit/g, Tamsulosin 0.4 mg, Tradjenta 5 mg, Tramadol 50 mg, Warfarin 5 mg

Patient allergy history

NKDA

Family medical history

mother: maternal grandmother (+) Type 2 Diabetes
father: no known medical history

Review of systems

Constitutional/general health: denies

Ear/nose/throat: denies
Cardiovascular: denies
Pulmonary: Endocrine: denies
Dermatological: denies
Gastrointestinal: denies
Genitourinary: denies
Musculoskeletal: denies
Neurologic: denies
Psychiatric: denies
Immunologic: denies
Hematologic: denies

Mental status

Orientation: oriented to person, place, and time
Mood/Affect: normal

Clinical findings

BVA sc:

	Distance	Near
OD:	20/80 (PH 20/60)	0.4/0.6 M
OS:	20/50 (PH 20/25)	0.4/0.6 M

Pupils:
PERRL, 3+ Direct, (-) APD; 2 mm bright OD/OS and 3 mm dim OD/OS
EOMs:
OD: Full w/ no restrictions
OS: restricted upgaze and downgaze (longstanding since trauma OS)
Confrontation fields:
OD: FTFC
OS: FTFC
Hirschberg: symmetric

Subjective refraction:

	VA Distance	VA Near
OD: -1.00 sph	20/50	0.4/0.5 M
OS: -0.50 sph	20/25	0.4/0.5 M
ADD: +2.50		

Slit lamp:
Lids/lashes/adnexa: adnexa normal mild capping superior and inferior lids, scalloping of lid margins OD & OS
Conjunctiva: diffuse melanosis, pinguecula nasal and temporal OD & OS
Cornea: normal endothelium, epithelium, stroma, oily tear film, inferior punctate epithelial epitheliopathy OD &OS
Anterior chamber: deep and quiet OD & OS (-) cells or flare OU
Iris:
OD: flat and intact, brown, (-) NVI, iris nevus @ 7 o'clock
OS: flat and intact, brown, (-) NVI, iris nevus @ 3 o'clock
Lens: 1+ NS, 2+ CS within visual axis, trace PSC outside the visual axis OD & OS
Vitreous: clear and quiet OD & OS
IOPs/method: 16/16 mmHg, Goldmann
Fundus OD:
ONH & C/D: well perfused, margins distinct, no elevation, (-) NVD, 0.65/0.70

Macula: scattered dot/blot hemes along ST arcade, worse T, (-) DME, IRMAs, CWS, venous beading, exudates
Periphery: multiple dot/blot hemes in mid-periphery SN, S, ST, T, IT, (-) NVE, RD, breaks

Fundus OS:

ONH & C/D: well perfused, margins distinct, no elevation, (-) NVD, 0.60/0.70
Macula: few dot hemes on ST arcade arcade near ONH, (-) CSME, IRMAs, CWS, venous beading, exudates
Periphery: rare dot hemes in mid-periphery, chorioretinal scar IT, (-) NVE, RD, breaks

Blood pressure: 138/84 LAS at 1:11 pm

Case Images:

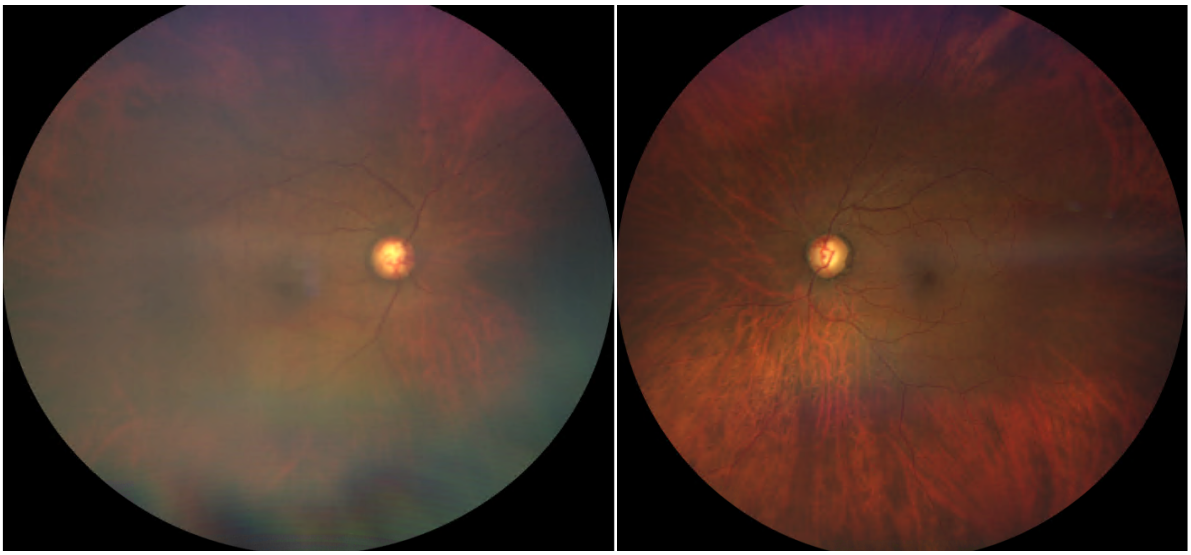

Figure 1: Clarus colored fundus photographs of posterior pole OD and OS, respectively. Of note, the lenticular opacities thwarted attempts to get clear fundus photographs OD>OS hence, the retinal hemorrhages OD>>OS were best visualized on dilated funduscopic evaluation.

Case Management Summary

1. **Retinal Ischemia (H35.82), OD, OS**
   Diff Dx: Ocular Ischemic Syndrome (OIS) vs. asymmetric diabetic retinopathy (DR)
   Hx of IDDM2 x 1 year, longstanding arterial HTN, high cholesterol, and blood clots in both legs
   -LFBS: 117 mg/dL
   -La1c: unknown
   DFE revealed multiple dot/ blot hemes along the ST arcade and in the mid-periphery OD (SN, S, ST, T, IT), few dot hemes along ST arcade near ONH OS
   (-) NVI, NVD, NVE OU (-) CWS, exudates, venous beading, IRMAs, DME
   Patient has hx of blood clots in both legs, HTN, and high cholesterol, leading to possible differentials of OIS versus asymmetric DR. Given asymmetry and duration of IDDM2 diagnosis, OIS was determined to likely be the primary contributor to disease.

Patient was educated about the examination findings including the asymmetric presentation of bleeding between the eyes. We discussed the likelihood for underlying systemic etiology, including potential stenosis/occlusion of the carotid arteries. The patient was educated on the importance of continued systemic control of blood sugar and taking medication/insulin as instructed for control of diabetes. A letter was sent to the PCP detailing the findings and suggesting a carotid workup to rule out OIS and/or underlying cardiovascular disease leading to these findings. Patient scheduled to return in 4 months to monitor condition and check in regarding any PCP findings.

2. **Open angle w/ borderline findings (H40.013), OD, OS**
   Dx: Open Angle Glaucoma suspect, OU
   (-) family hx
   (+) history of trauma OS
   (+) Black/African American race
   (+) increased C/D ratio: C/D ratio: 0.65/0.70 OD, 0.60/0.70 OS
   (-) notch, drance heme, alpha/beta zones
   IOP at date of examination: 16/16 mmHg
   TMax: 18/18 mmHg
   Current Tx: No medication, observation
   Ocular Surgeries: None
   DFE, OCT ONH with GCC analysis, and fundus photography were completed at the date of our examination. Imaging was generally unreliable due to patient fatigue and limited mobility. OCT ONH and fundus photography suggested deep and large cupping, outside the normative database. GCC analysis suggested floor effect in both eyes.

   Patient was educated on these examination findings. Educated about glaucoma being a sight-threatening condition the importance of further testing and monitoring IOP at each visit. Educated that no definitive diagnosis of glaucoma is being made at the time of our examination and that we will continue to monitor these findings at further visits. Monitor IOP and consider repeating OCT at follow-up in 4 months.

3. **Combined forms of age-related cataracts (H25.813), OD, OS**
   Dx: 1+ Nuclear Sclerosis, 2+ Cortical Spoking within visual axis, and trace Posterior Subcapsular Cataracts OU
   Hx reveals longstanding cataracts. Patient was symptomatic of increased glare/halos especially at night and cloudiness of vision not alleviated by spectacles. Patient denies any issues with completing ADLs.
   (+) Hx of long-term corticosteroid use
   -BCVA: 20/50 OD and 20/25 OS

   Patient was educated on these examination findings. Educated about cataracts being a natural aging process of the lens and the potential for corticosteroid use to exacerbate their progression. Of note, the patient was previously cleared for cataract surgery by surgeon a year prior to our examination. Patient expressed interest in cataract extraction but stated he will most likely defer the surgery until after he is discharged from assisted living and his systemic health stabilizes. Monitor status of cataracts at follow-up in 4

months, sooner if any significant visual changes occur.

4. **Presbyopia (H52.4), OD, OS**
   Dx: Refraction revealed simple myopia OU w/ presbyopia OU
   -BCVA at distance: 20/50 OD, 20/25 OS
   -Patient appreciated a +2.50 ADD at near with BCVA: 0.4/0.5 M OD, OS, OU

   Patient was educated on these examination findings. A full-time spectacle Rx was dispensed at the date of the examination. Educated that the Rx may improve visual acuity but will not perfect his acuity due to coexisting findings (cataracts, etc.). Educated to defer filling this spectacle Rx if he elects to proceed with cataract extraction within a month after our examination as the procedure would change his overall refractive status. Monitor refractive status at follow-up in 4 months, sooner if any significant visual changes occur.

Case Pearls

1. **When it comes to retino-vascular pathologies, keep a long list of differentials and know when to include OIS...**
   In cases of hemorrhaging in all four quadrants, particularly in one eye, it is important to be able to construct a list of differential diagnoses that should include central retinal vein occlusion (CRVO), diabetic retinopathy (DR), and ocular ischemic syndrome (OIS). In addition to more common differentials, it is important to consider other rare etiologies such as hypercoagulable and hyperviscosity syndromes. It is imperative to note significant disparities in each condition's clinical manifestations which aids in establishing the correct diagnosis. The presence of tortuous retinal veins suggests a likelihood of CRVO, as this characteristic is not commonly present in OIS. When distinguishing between DR and OIS, research has shown that OIS generally exhibits fewer intraretinal hemorrhages compared to the former condition. The location of these hemorrhages is commonly in the mid-periphery of the retina in OIS, while hemorrhaging associated with diabetes is commonly located in the posterior pole. The presence of hard exudates likely indicates a diabetic etiology as compared to OIS. For those optometrists comfortable performing carotid auscultation with their stethoscope, patients can be screened for carotid bruit.

2. **…But remember that patients can present with multiple coexisting conditions**
   An important note to consider is that DR may occasionally present alongside OIS. In fact, *any* condition can present alongside OIS, because patients are not limited to just having one disease. Given the macular involvement of hemorrhaging for our patient, it is likely he was presenting with both DR and OIS, but OIS still remains our top differential due to the asymmetry of retinopathy between the eyes and the duration of his diabetes (only 1 year since diagnosis). If there is noticeable asymmetric or unilateral retinopathy, OIS should immediately be on your list of differentials.

3. **The definitive diagnosis of OIS is made based on clinical findings alone.**
   The generalized process of diagnosing OIS includes, but is not limited to, a detailed medical history, VA assessment, measurement of IOPs, and an examination of the

anterior/posterior ocular structures. Dilated funduscopic evaluation is key in diagnosis and many times, as in this case, can prove to be superior to fundus photographs alone when media opacity is significant. In cases where funduscopic findings remain inconclusive, fluorescein angiography (FA) can be a valuable diagnostic tool to shed light on underlying causes. Noteworthy features observed in OIS, but absent in other common differentials, include choroidal filling defects and retinal arterial stasis. OCT-Angiography and Doppler ultrasound may additionally be performed to assess blood flow and detect any abnormalities in the blood vessels supplying the eyes.

4. **Systemic management of OIS should be timely.**
In terms of ocular sequelae of OIS, compromised blood flow to the eye can result in reduced visual acuity, reduced contrast sensitivity, and monocular visual field defects. OIS can lead to the development of neovascular glaucoma - a severe form of glaucoma characterized by the abnormal growth of blood vessels in the anterior chamber angle - causing elevated IOP and optic nerve damage. In advanced cases, retinal detachment may occur, further exacerbating vision loss. Our goal is to preserve vision and prevent further visual complications, so management of OIS on our end involves appropriately treating any of these potential sequelae and educating our patients on how their vision is being affected.

   A majority of the management for OIS, however, is systemic. The underlying cause of the condition is typically a significant stenosis or occlusion of the carotid artery, which is responsible for supplying blood to the brain. This vascular impairment increases the risk of cerebrovascular events, such as transient ischemic attacks (TIAs) or strokes, which can have debilitating consequences on a person's neurological function and overall well-being. Additionally, systemic vascular diseases, including atherosclerosis and hypertension, often coexist with OIS, leading to cardiovascular disease and peripheral arterial disease. In many cases, cardiovascular disease associated with OIS is diagnosed *after* retinal findings are discovered by optometrists/ophthalmologists. Thus, it is crucial to consider OIS without a confirmed diagnosis of carotid occlusive disease, as recent studies have revealed that a majority of patients (>60%) diagnosed with OIS have not undergone carotid imaging prior to fundoscopic examination. The mortality rate for OIS over a five-year period has been estimated to be approximately 40%, primarily due to the severe burden of atherosclerotic disease.

   Due to these potentially fatal complications, it is imperative to consider systemic evaluation in office. In the office, blood pressure can be administered and patients can be asked about stroke related symptoms. Afterwards, OIS patients can promptly be referred to an established healthcare team such as cardiology, neurology, and PCP for systemic work-up including carotid artery imaging and bloodwork. Optometrists are a critical portion of the intradisciplinary team needed to co-manage these complex cardiovascular conditions.