Ocular Manifestations of Systemic Cardiovascular Disease
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Abstract

Hollenhorst plaques, amaurosis fugax, and venous stasis retinopathy are amongst the ophthalmic manifestations of cardiovascular disease (SCVD). We present cases illustrating the ocular complications of SCVD, reviewing the etiology, pathophysiology and management of each.

Patient 1

Demographics: 59-year-old African American female
Chief Complaint: red eyes
History of Present Illness:
  Characteristics/Signs/Symptoms: redness
  Location: OS>OD
  Severity: Moderate
  Nature of onset: longstanding, years
  Frequency: constant
  Exacerbations/Remissions: No relief with systane prn
Patient Ocular History: Unremarkable
Patient Medical History: Diabetes Type 2 x 5 years, Hypertension
Patient Medication: Hydrochlorothiazide/Triamterene, Lisinopril, Metformin
Patient's Allergies: NKDA, NKMA
Patient's Social History:
  Smoking: denies
  Drugs: denies
  Alcohol: denies
Patient's Family Medical History:
  Diabetes: MGM
  Cancer: M. Aunt
  Heart Disease: Father
Patient's Family Ocular History:
  Glaucoma: MGM
  Blindness: MGM
Review of Systems:
  Constitutional: denies
  Ear/Nose/Throat: denies
  Cardiovascular: Hypertension
  Pulmonary: denies
  Endocrinology: Diabetes Type 2
  Dermatologic: denies
  Gastrointestinal: denies
  Genitourinary: denies
Musculoskeletal: denies
Neurologic: denies
Psychiatric: denies
Immunologic: denies
Hematologic: denies

Mental Status:
Orientation: Oriented to time, place, person
Mood: Appropriate
Affect: Appropriate

Clinical Findings:
Best correct visual acuity (distance)  OD: 20/20  OS: 20/20
Pupils: PERRL (-) APD OD, OS
Extraocular Muscles: FROM OU
Confrontation Visual Field: FTFC, OD, OS
Slit Lamp Examination:
  Lids/Lashes/Adnexa: 1+ capped glands and debris on lashes OD, OS
  Conjunctiva: OD: 1+ diffuse bulbar injection, racial melanosis
  OS: 1-2+ diffuse bulbar injection, racial melanosis
  Cornea: OD: clear
  OS: trace inferior PEE, inferior nasal pannus <1mm on cornea
  Anterior chamber: (-) cell (-) flare OD, OS
  Iris: flat, brown (-) NVI OD, OS
  Lens: Trace nuclear sclerosis, OD, OS
Intraocular Pressure: OD: 16mm Hg  OS: 16mmHg measure with Goldman
applanation tonometry @11:18am
Blood Pressure: 128/88 RAS 11:20am
Posterior Segment Examination:
  Vitreous: (-) vitreous hemorrhage OD, OS
  Optic Disc: OD: perfused, healthy, distinct margins, no apparent
  notching, (-) NVD, C/D: 0.7R
  OS: perfused, healthy, distinct margins, no apparent
  notching, (-) NVD, C/D: 0.6R
  Macula: Flat, avascular (-) CSME OD, OS
  Vessels: OD: ½ artery/vein ratio, mild arteriosclerotic changes
  OS: ½ artery/vein ratio, mild arteriosclerotic changes
  2 hollenhorst plaques within inferior arcade at second
  bifurcation
  Periphery: (-) breaks (-) detachments (-) NVE OD, OS
Differential Diagnosis:
  Hollenhorst plaque associated with systemic cardiovascular disease
  Central/Branch retinal artery occlusion
  Talc Retinopathy

Patient 2

Demographics: 39-year-old African American male
Chief Complaint: transient vision loss

History of Present Illness:
- Characteristics/Signs/Symptoms: blackening of vision for 30 seconds
- Location: OD
- Nature of onset: upon awakening this morning
- Frequency: second episode
- Exacerbations/Remissions: previous episode in the right eye upon awakening lasting for 1 minute
- Association: right temporal ache, intermittent, denies jaw claudication or scalp tenderness

Patient Ocular History: s/p LASIK OU x 2007, foreign body removal OS x 2013

Patient Medical History: Unremarkable

Patient Medication: None

Patient's Allergies: NKDA, NKMA

Patient's Social History:
- Smoking: cigarettes, <1PPD
- Drugs: denies
- Alcohol: Liquor, 4 or more per week

Patient's Family Medical History:
- Diabetes: P. Aunt
- Hypertension: Father

Patient's Family Ocular History: unremarkable by history

Review of Systems:
- Constitutional: denies
- Ear/Nose/Throat: denies
- Cardiovascular: denies
- Pulmonary: denies
- Endocrinology: denies
- Dermatologic: denies
- Gastrointestinal: denies
- Genitourinary: denies
- Musculoskeletal: denies
- Neurologic: denies
- Psychiatric: denies
- Immunologic: denies
- Hematologic: denies

Mental Status:
- Orientation: Oriented to time, place, person
- Mood: Appropriate
- Affect: Appropriate

Clinical Findings:
- Entering visual acuity (distance) OD: 20/20- OS: 20/30-
- Pupils: PERRL (-) APD OD, OS
- Extraocular Muscles: FROM OU
- Confrontation Visual Field: FTFC, OD, OS
- Slit Lamp Examination:
**Lids/Lashes/Adnexa:** 1+ capped glands and debris on lashes OD, OS  
**Conjunctiva:** OD: racial melanosis  
OS: racial melanosis  
**Cornea:** OD: LASIK flap centered and flat  
OS: LASIK flap centered and flat  
Irregular corneal scar inf/temp to visual axis  
**Anterior chamber:** deep and quiet OD, OS  
**Iris:** flat, brown OD, OS  
**Lens:** clear OD, OS  
**Intraocular Pressure:** OD: 15mm Hg  OS: 16mmHg measure with Goldman applanation tonometry @ 1:17pm  
**Blood Pressure:** 136/98 RAS 1:21pm (-) HA (-) shortness of breath  
(-) confusion (-) nausea  
**Carotid Auscultation:** No apparent bruit on right and left sides  
**Posterior Segment Examination:**  
**Vitreous:** clear  
**Optic Disc:** OD: perfused, healthy, distinct margins, no apparent notching, C/D: 0.4R  
OS: perfused, healthy, distinct margins, no apparent notching, C/D: 0.45R  
**Macula:** Flat, avascular OD, OS  
**Vessels:** OD: normal course and caliber  
(-) evidence of plaque/emboli  
OS: normal course and caliber  
(-) evidence of plaque/emboli  
**Periphery:** OD: (-) breaks (-) detachments  
OS: large CHRPE superior-temporally, flat  
**Differential Diagnosis:**  
Amaurosis Fugax  
Transient Visual Obscuration  
Giant Cell Arteritis  

**Patient 3**  
**Demographics:** 47-year-old African American male  
**Chief Complaint:** no complaints, yearly diabetic examination  
**History of Present Illness:**  
**Characteristics/Signs/Symptoms:** none  
**Location:** OU  
**Severity:** h/o mid-peripheral hemorrhages OU  
**Nature of onset:** Diabetes Type 1 x 29 years  
**Frequency:** constant  
**Exacerbations/Remissions:** Patient on insulin, denies visual changes  
**Patient Ocular History:** Mild NPDR OU, Mid-peripheral hemorrhages OU  
**Patient Medical History:** Diabetes Type 1 x 29 years, Hypertension, Hypercholesterolemia,
Patient Medication: Unknown water pill, simvastatin, lantus
Patient's Allergies: NKDA, NKMA
Patient's Social History:
  Smoking: denies
  Drugs: denies
  Alcohol: denies
Patient's Family Medical History:
  Diabetes: mother, sister
Patient's Family Ocular History: unremarkable by history
Review of Systems:
  Constitutional: denies
  Ear/Nose/Throat: denies
  Cardiovascular: Hypertension, Hypercholesterolemia
  Pulmonary: denies
  Endocrinology: Diabetes Type 1 x 29 years
  Dermatologic: denies
  Gastrointestinal: s/p left kidney transplant x 2006
  Genitourinary: denies
  Musculoskeletal: joint pain
  Neurologic: denies
  Psychiatric: denies
  Immunologic: denies
  Hematologic: denies
Mental Status:
  Orientation: Oriented to time, place, person
  Mood: Appropriate
  Affect: Appropriate
Clinical Findings:
  Best correct visual acuity (distance)  OD: 20/20  OS: 20/20
  Pupils: Sluggish to light OU, (-) APD OU response to near>light OU
  Extraocular Muscles: FROM OU
  Confrontation Visual Field: FTFC, OD, OS
  Slit Lamp Examination:
    Lids/Lashes/Adnexa: 1+ capped glands and debris on lashes OD, OS
    Conjunctiva: OD: trace diffuse bulbar injection, racial melanosis, inferior palpebral concretions
    OS: trace diffuse bulbar injection, racial melanosis inferior palpebral concretions
    Cornea: OD: clear
    OS: clear
    Anterior chamber: (-) cell (-) flare OD, OS
    Iris: flat, brown (-) NVI OD, OS
    Lens: 1+ Nuclear sclerosis, OD, OS
  Intraocular Pressure: OD: 10mm Hg  OS: 11mmHg measure with Tonopen @11:09am
  Blood Pressure: 135/80 RAS 11:07am
Posterior Segment Examination:

**Vitreous:** (-) vitreous hemorrhage OD, OS

**Optic Disc:** OD: perfused, healthy, distinct margins, no apparent notching, (-) NVD, C/D: 0.5R  
OS: perfused, healthy, distinct margins, no apparent notching, (-) NVD, C/D: 0.2R

**Macula:** scattered dot hemes and microaneurysms (-) CSME OD, OS

**Vessels:** OD: ½ artery/vein ratio, venous omega loop superior temporal arcade, dilated veins without tortuosity  
OS: ½ artery/vein ratio, dilated veins without tortuosity, areas of intraretinal microvascular abnormalities within temporal arcades

**Periphery:** OD: midperipheral hemes temporally, intraretinal microvascular abnormalities superior nasal and inferior nasal (-) breaks (-) detachments (-) apparent NVE  
OS: midperipheral hemes temporally

Differential Diagnosis:

- Venous Stasis Retinopathy
- Ocular Ischemic Syndrome
- Proliferative Diabetic Retinopathy
- Hemorrhage secondary to Posterior Vitreous Detachment
- Valsalva Retinopathy

Diagnosis

**Patient 1:** The patient was diagnosed with hollenhorst plaques secondary to cardiovascular disease. Given the patient's medical history, with concomitant Diabetes Type 2 and Hypertension, the patient is at an increased risk for stroke and heart attack. It is difficult to attest the etiology of the plaques since we have not received the results from ultrasound/laboratory tests. Hollenhorst plaques are thought to arise as an ulcerated cholesterol fragment from atherosclerotic changes within the cardiac valves, lumens of the aorta and/or carotid arteries. Findings to the patient’s primary care physician were communicated to consider carotid doppler, stress echocardiogram, complete blood count, metabolic panel and cardiac enzyme laboratory tests.

**Patient 2:** A definitive diagnosis has not been concluded pending additional cardiac and metabolic testing, as requested to the patient’s primary care physician. Although atypical for his age, the patient’s symptoms of amaurosis fugax and ipsilateral temporal pain raise the question of giant cell arteritis. As a result, the patient’s primary care physician was called in-office to inquire if he felt the patient needed to be sent to the emergency department. A summary of the patient’s ophthalmologic findings was faxed over to the primary care physician and the patient was sent home with a follow up appointment a few days later with his physician. The summary instructed the physician to consider carotid doppler, stress echocardiogram, complete
blood count, metabolic panel, cardiac enzyme, C-reactive protein and Westergen sedimentation rate laboratory tests.

**Patient 3:** The patient has been diagnosed with bilateral venous stasis retinopathy. The patient is followed by his primary care physician and endocrinologist every 3 months, given his Type 1 diabetes. A letter of his ophthalmologic findings has been sent to the patient's primary care physician requesting a carotid doppler and any other tests he feels appropriate.

In a study completed by McCullough *et al.*, hollenhorst plaques, amaurosis fugax and venous stasis retinopathy all were associated with significant carotid artery disease in 1 in 5 carotid arteries. There was no association to significant carotid artery disease in other ophthalmologic findings such as asymmetric diabetic retinopathy, anterior ischemic optic neuropathy, and optic atrophy to name a few.

**Treatment/Management:**

All patients were made aware of their ophthalmologic findings, respectively and compliance with strict blood sugar, blood pressure, cholesterol levels, follow up and taking medication as prescribed was stressed. All three patient’s test results are pending at this time. Once the underlying condition is diagnosed, the patient will be managed by their primary care physician and/or other sub-specialist in the respective fields. We will continue to monitor closely for any new ophthalmologic findings, pre-existing ocular conditions and or changes to vision as necessary.

**Conclusion**

Yearly dilated eye exams play a critical role in the early detection of cardiovascular disease, and may be the first sign of increased mortality in those affected. We have presented 3 cases, 2 of which the patient was asymptomatic despite the ocular findings and 1 case where the symptoms did not match the clinical picture. These 3 cases solidify an Optometrist’s role in the primary health care team of the patient, making appropriate referrals when necessary.

**Work Cited:**