Ocular Ischemic Syndrome
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Abstract
Ocular ischemic syndrome is a rare condition caused by chronic ocular hypoperfusion, usually from severe carotid artery stenosis. Its high mortality rate makes recognition of ocular signs and prompt specialist referral imperative for patient care.

I. Case history
A. Patient demographics: 63 year old African American male
B. Chief complaint: routine eye exam; no visual or ocular complaints
C. Ocular history: unremarkable
D. Medical history: hypertension, hyperlipidemia, history of left-sided middle cerebral artery stroke 3 months prior to eye exam
E. Medications: aspirin, hydrochlorothiazide, lisinopril, simvastatin

II. Pertinent findings
A. Clinical findings - initial visit
   1. BCVA: OD 20/20, OS 20/20
   2. Pupils: OD 4.0/2.5, OS 5.0/3.5mm, reactive to light, (-)APD
   3. Anterior segment findings
      a. OD: unremarkable, (-)NVI
      b. OS: engorgement of episcleral vessels, (-)NVI
   4. IOP: OD 16 mmHg, OS 12 mmHg
   5. Posterior segment findings
      a. OD: 0.1 with healthy disc margins, (-)pallor; macula, vessels, and periphery within normal limits
      b. OS: 0.1 with healthy disc margins, (-)pallor; blot hemorrhages scattered in mid-periphery in all quadrants; engorged retinal veins with beading

B. Pertinent laboratory testing
   1. Carotid ultrasound revealed 100% blockage of the left internal carotid artery and less than 50% stenosis in the right internal carotid artery

C. Clinical findings at 1 month follow-up
   1. BCVA: OD 20/20, OS 20/20
   2. IOP: OD 15 mmHg, OS 13 mmHg
   3. Anterior and posterior segment findings remained unchanged

D. Clinical findings at 3 month follow-up
   1. BCVA: OD 20/20, OS 20/20
   2. Anterior segment findings
      a. OD: unremarkable, (-)NVI
      b. OS: engorgement of episcleral vessels; (+)NVI at 2:00-4:00 and at 6:00, (-)cells or flare
         i. Gonioscopy: neovascularization of angle at 3:00 and at 6:00, (-) anterior synechiae
   3. IOP: OD 14 mmHg, OS 14 mmHg
   4. Posterior segment findings remained unchanged
5. Initiation of treatment: mild-scatter panretinal photocoagulation (PRP) 360 OS

E. Clinical findings at 5 month follow-up
1. BCVA: OD 20/20, OS 20/20
2. Anterior segment findings
   a. OD: unremarkable, (-)NVI
   b. OS: engorgement of episcleral vessels; (-)NVI; (-)cells or flare
3. Posterior segment findings
   a. OD: 0.1 with healthy disc margins, (-)pallor; macula, vessels, and periphery within normal limits
   b. OS: 0.1 with healthy disc margins (-)pallor; blot hemorrhages scattered in mid-periphery in all quadrants; (+)mild-scatter PRP scars 360; engorged retinal veins with beading

III. Differential diagnosis
A. Diabetic retinopathy (DR)
   1. Usually bilateral, may be asymmetric
   2. Blot hemorrhages in both posterior pole and mid-periphery
   3. Other DR findings include hard exudates and intraretinal microvascular abnormalities
B. Central retinal vein occlusion (CRVO)
   1. Retinal veins are dilated and tortuous in CRVO
   2. Hemorrhages usually flame-shaped and occur in posterior pole
   3. Macular edema may be present
C. In the absence of atherosclerotic and arteriosclerotic risk factors (e.g. hypertension and diabetes):
   1. Giant cell arteritis
   2. Aortic arch syndrome
   3. Takayasu arteritis

IV. Diagnosis and discussion
A. Pathogenesis
   1. Ocular ischemic syndrome (OIS) results from inadequate oxygen perfusion to the eye secondary to blockage of the common or internal carotid arteries (or less commonly, the ophthalmic artery). Carotid evaluation typically shows stenosis greater than 90% before ocular signs are present.
   2. The pathogenesis is decreased arterial inflow on a chronic basis, though the period and extent of impaired blood flow necessary to develop OIS is not clear.
   3. Approximately 4% of patients with carotid occlusive disease show ocular signs of ischemia
   4. Most commonly affects men above the age of 50 with hypertension and diabetes
B. Common anterior segment signs
   1. Conjunctival and episcleral injection
   2. Fixed semi-dilated pupil
   3. Neovascularization of the iris and/or anterior chamber angle
   4. Mild anterior chamber reaction
C. Common posterior segment signs
   1. Blot hemorrhages in mid-periphery
   2. Dilated, non-tortuous veins with or without beading
   3. Retinal arterial attenuation
   4. Cotton-wool spots
   5. Optic disc pallor
6. Neovascularization on the disc or elsewhere

D. Other tests
1. Fluorescein angiography shows a delay in choroidal filling and non-filling of retinal vessels
2. Electroretinography shows decreased amplitude of both a and b waves due to ischemia of both the inner and outer retina from poor retinal and choroidal circulation
3. Visual evoked potential shows an increase in latency and a decrease in amplitude

E. Symptoms
1. Decreased vision (91% of patients) - severity varies from 20/25 to count fingers
2. Dull ache over the eye or brow
3. Transient monocular vision (up to 15% of patients)

F. Prognosis
1. Five year mortality rate for OIS is 40%; the two leading causes of death are ischemic heart disease and stroke
2. By the end of the first year of diagnosis, 58% of eyes progress to counting fingers or worse

V. Treatment and management
A. Ophthalmic management
1. Perform PRP in cases where neovascularization exists
2. Treat any associated anterior uveitis
3. Manage neovascular glaucoma if present

B. Systemic management
1. Carotid evaluation is crucial
   a. Carotid revascularization surgery (e.g. carotid endarterectomy and carotid artery stenting) usually indicated in cases of 70-99% stenosis
      i. Up to 60% of patients who undergo surgery show improvement in visual symptoms
   b. If blockage is less than 70%, oral anticoagulant therapy is indicated
   c. Surgery not performed if carotid blockage is 100%
2. Tight control of systemic hypertension, diabetes, and cholesterol; smoking cessation

C. Bibliography

VI. Conclusion
Complications associated with ocular ischemic syndrome may lead to irreversible vision loss. Signs of severe carotid artery stenosis may be first observed in the eye before they are manifested in the cerebrovascular system; thus, as primary eye care providers, it is vital that the correct diagnosis is made so appropriate referrals can be sought.