Title:
Segmentation of Inner Nuclear Layer Prompts Optometric Detection of Carotid Bruit

Abstract:
Patient seeks explanation for his longstanding color desaturation OS. Segmentation of individual retinal layers reveals atrophy isolated to the inner nuclear layer OS. Optometric detection of an ipsilateral carotid bruit ensues.

Case History:
- 74 year old Caucasian male
- CC: Inquiring into etiology of color vision abnormality in OS, longstanding/stable since 2009, no color vision abnormality in OD, Reports OD/OS difference bothersome especially when driving, (+)glare OS>>OD.
- POHx: (+)cataracts—minimal and symmetrical OU
- PMHx: (+)HTN, hyperlipidemia, iron deficient anemia, GERD, migraine
- Medications: atorvastatin, omeprazole, verapamil, cholecalciferol, aspirin

Pertinent Findings:
- DVAcc:
  - OD 20/20; OS 20/25 PH:NI
- EOMs & CVFs: Unremarkable OU
- Pupils: ERRLA (-)APD OU
- Red Cap Test: (+)desaturation OS
- D15 Color Test:
  - all tiles in correct order OD
  - 1 tile transposed but with no crossover OS
- 24-2 HVF: no defects OD & OS
- SLE:
  - Lids/Lashes/Conj/Sclera/Cornea/Angles/Iris WNL OU
  - Lens: 1+ NS OU, trace CS OS
- DFE:
  - C/D: 0.25R OS, 0.3R OD, (-)pallor OU, NRR intact 360 OU
  - Macula: pinpoint drusen OS>OD
- SD-OCT Retinal Thickness Map:
  - OS grossly thinner than OD globally—approx 30 microns thinner in each individual sector
  - Segmentation of individual layers reveals INL extensively thinned in OS versus OD—all other layers symmetrical
- Auscultation of Carotid Artery: (+)bruit of left carotid
- Carotid Triplex Ultrasound:
  - 50-79% stenosis of right ICA, PSV: 126 cm/sec, EDV: 36 cm/sec
  - 80-99% stenosis of left ICA, PSV: 417 cm/sec, EDV: 161 cm/sec
- CT of Head & Neck:
  - 70% stenosis (in a 2.5 cm long proximal atherosclerotic plaque) involving the left ICA
  - 50% stenosis involving the right ICA in the distal carotid bulb
o 60% stenosis in the origin of the larger left vertebral artery
o No intracranial abnormalities noted

Differential Diagnosis:

✓ Primary: INL thinning presumed secondary to previous primary acute middle maculopathy (PAMM)
✓ Others: CRVO, RAO, diabetic macular ischemia, amaurosis fugax

Diagnosis, Discussion:

✓ Variant of acute macular neuroretinopathy (AMN)
  o Affects the middle layers of the macula above the OPL
    ▪ Lesions may be focal or diffuse
  o Caused by occlusion of the deep capillary plexus—eventual retinal capillary ischemia—eventual atrophy of INL
  o Diagnosed w/ SD-OCT imaging
    ▪ Appearance: hyperreflective bands (early) in the OPL/INL region with subsequent INL thinning (later)
  o Possible small paracentral scotoma
  o VA ranges from 20/15 to 20/30
  o Occurs in patients w/ vasculopathic risk factors
✓ Case uniqueness
  o Pt had (+)color desaturation and (-)scotoma
  o No hyperreflective bands apparent (observable in the acute stage)—diagnosis based on retinal segmentation of thinned INL (which occurs later in the process)
  o Detection of ipsilateral carotid bruit
  o Another novel variant of AMN?

Treatment, Management:

✓ No documented treatment for improvement/reversal of AMN
✓ Identify vasculopathic risk factors
  o Prevention of condition occurring in fellow eye
✓ If bruit detected:
  o Ordering of carotid ultrasound and CT-A of Head/Neck (depending on ultrasound results)
  o Referral to vascular specialist
✓ References:

Conclusion:

- Importance of understanding ocular/retinal vasculature
- Knowledge of detailed capabilities of instrumentation
- Significance of detecting a carotid bruit