Case Report: Vascular Compression of the Optic Chiasm by a Tortuous and Enlarged Internal Carotid Artery

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Abstract:
Visual field defects related to optic chiasm compression can overlap with glaucoma and optic neuropathy findings. The following case demonstrates the importance of imaging in the diagnosis of optic chiasm compression by vascular etiologies.

I. Case History
- 74 year old Caucasian male
- **Chief complaint:**
  - Patient presents for glaucoma evaluation, previously diagnosed with glaucoma in the left eye but treatment was not initiated
- **Ocular history**
  - Posterior chamber intraocular lens (PCIOL) OD
  - Cataracts OS
- **Medical history:** cerebrovascular accident two years prior resulting in left hemiplegia, aortic valve disease, hypertrophy of the prostate, arteriosclerotic cardiovascular disease, mixed hyperlipidemia, chronic anxiety, erectile dysfunction, peripheral vascular disease, urinary tract infections and insomnia
- **Medications:** Alprazolam, Aspirin, Bisacodyl, Docusare, Cilostazol, Hydrocodone, Tramadol, Phenazopyridine, Simvastin, Tamsulosin, Temazepam, Vardenafil
- **Allergies:** Penicillin, Morphine, Methadone, Plavix 75mg

II. Pertinent findings
- **Clinical Exam #1**
  - VA: OD 10/600 FB, OS: 20/100 PH 20/40
  - Intact pupillary function OU
  - No pain or restriction on eye movement OU
  - Confrontation fields: unable to respond OD, and restricted OS
  - Anterior segment examination OU:
    - OD: 4+ posterior capsular opacification (PCO) with Elschnig pearls
    - OS: 2+ nuclear sclerotic and cortical cataract
  - Posterior segment examination OU
    - OD not viewed due to dense PCO; OS cup to disk 0.6 V x 0.75 H cupped inferior rim with questionable pallor
    - B-scan confirmed no retinal detachment or mass lesion OD
  - Intraocular pressure: Goldman 22/22 mmHg
  - Referral for YAG capsulotomy OD
- **Follow up exam post YAG**
  - VA: OD 20/20, OS: 20/40-
  - Posterior segment examination OU
- OD cup to disk 0.65V x 0.55H with thinning inferior and superior with questionable pallor
- OS cup to disk 0.60V x 0.75H cupped inferior rim with questionable pallor
  - Color testing: normal OD, OS
  - Threshold visual field 24-2: superior altitudinal defect OU, nasal hemianopsia OD
  - Serial visual fields
  - OKN drum testing
  - Fundus photos
  - OCT nerve fiber layer scans

**Radiology studies:**
- CT scans with and without contrast (head) persistent trigeminal artery arising from the cavernous segment of the left ICA
- MRI (brain/neck/pituitary): Normal pituitary gland. Significant tortuosity of both ICAs especially on the left with elevation of the left aspect of the optic chiasm.
- MRA: aberrant origin of the basilar artery that appears to arise from left ICA

**Laboratory studies:**
- Complete blood count, comprehensive metabolic panel, coagulation factors, lipid panel

### III. Differential diagnosis
- **Primary:** Non-arteritic ischemic optic neuropathy (NAION) with mixed etiology of neurological defects
- **Others:** Compressive lesion, glaucoma

### IV. Diagnosis and discussion
- **Diagnosis:**
  - Visual field defects secondary to optic chiasm compression from tortuous enlarged ICA
  - NAION
  - Glaucoma
- **Discussion**
  - Demographics
  - Ocular and vascular anatomy
  - Pathogenesis of nerve fiber layer damage secondary to glaucoma, optic neuropathy and vascular compression
  - Classification of visual field defects (specifically based on location of compression at the chiasm)
  - Use of imaging in diagnosis
- **Unique Features**
  - Rare occurrence of tortuous and enlarged carotid arteries causing compression on the optic chiasm

### V. Treatment, management
- **Management:**
  - Referral to neurosurgery, cardiology/vascular
Monitor with DFE, VFs

**Treatment:**
- Latanoprost qhs OU
- No known proven therapy for vascular compression of the optic chiasm from tortuous ICA
- Plan geared toward stroke prevention, identify and treat abnormal lipid metabolism

**Prognosis:** Progression of visual loss may be rapid, slow or even static

**Bibliography**

**VI. Conclusion**
- **Clinical pearls:**
  - Visual field defects of optic chiasm compression can overlap with glaucoma and optic neuropathy.
  - Importance of imaging in the diagnosis of optic chiasm compression by vascular etiologies.
  - Importance of understanding visual field defects in relation to vascular anomalies in order to appropriately treat and refer for neurological and systemic management.
  - Neurosurgical decompression is not a proven therapy for vascular compression. Treatment is generally geared towards stroke prevention.