



# Ophthalmology Update

Richmond Eye Associates, P.C.

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## Ophthalmic Topics of Interest to the Medical Physician

### Life Threatening Ophthalmic Disorders

This issue discusses actual cases where an ophthalmic diagnosis or symptom led to a much larger systemic diagnosis.

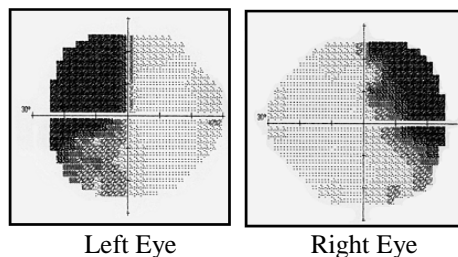
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#### Chief Complaint: "My wife made me come in."

A 64-year-old male presented for a routine eye examination without any complaints. The ophthalmic examination showed 20/25 vision in the right eye and 20/60 in the left, a normal anterior segment and intraocular pressure (low teens), normal pupillary function and ocular motility, and moderate nuclear sclerotic cataracts. The fundoscopic examination was normal except for mild optic nerve pallor and an increased cup-to-disc ratio of 0.6 in the right eye and 0.9 in the left. An automated visual field test was ordered with a suspicion of "low-pressure" glaucoma (or "normal-tension" glaucoma), especially of the left eye.

The visual field test was as shown below:



This bitemporal hemianopia was highly suspicious for a lesion of the optic nerve chiasm, and MRI testing showed a **3.5 X 4.0 cm** necrotic pituitary tumor elevating the optic nerves, and surrounding the cavernous carotid arteries. The tumor was surgically removed, and post-operatively the visual acuity improved to 20/20 and 20/40, and the visual field loss has remained stable.

This case shows the importance of periodic ophthalmic examinations and careful examination of the optic nerve, with a high index of suspicion for glaucoma or other optic neuropathies in spite of normal intraocular pressure measurements. Other conditions, which may mimic low-pressure glaucoma (as a diagnosis of exclusion), include ischemic optic neuropathy, a history of low systemic blood pressure or shock leading to infarction of the optic nerve, systemic vasculitis, and tumors of the anterior visual pathways.

#### In the Next Issue of

#### Ophthalmology Update:

##### Drug Side Effects

- Hydroxychloroquine
- Viagra Update
- Hormone Supplements
- Cocaine

#### A Red Eye - Conjunctivitis? Subconjunctival Hemorrhage?

A 57-year-old man with a history of a seizure disorder fell, striking his left periocular area on a chair. Mild ecchymosis was present, but the ocular examination and an orbital CT scan were negative. The patient then developed progressive pain around the left eye and

increasing hemorrhagic conjunctival edema (chemosis) over the next few weeks. While the visual acuity was 20/25 bilaterally, the overall condition deteriorated with an elevated pressure in the left eye, very restricted ocular motility

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## Red Eye (from page 1)

ity on the left, and proptosis. MRI imaging showed an engorged left superior ophthalmic vein and enlarged extraocular muscles. Angiography revealed the presence of a carotid-cavernous sinus fistula. Arterial blood pressure infuses the cavernous sinus, which in turn markedly raises the venous pressure of the orbit and eye itself leading to proptosis.

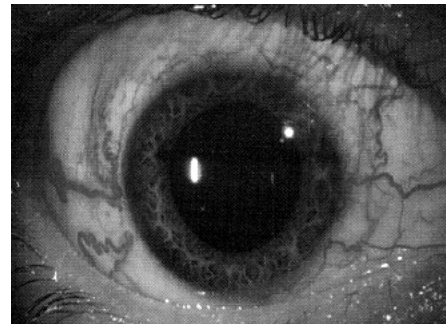
The patient underwent 2 courses of interventional embolization therapy with resolution of the pain, chemosis, and proptosis within 2 days of the second treatment.

A carotid artery – cavernous sinus fistula is an abnormal connection between the arterial system and the cavernous sinus. Typically the fistula develops after head trauma, but the trauma does not have to be severe. Direct connections between the artery and the sinus account for 70-90 percent of cases. Dural artery – cavernous sinus fistulas are also possible, but are less symptomatic.

Symptoms of progressive periocular engorgement following trauma should alert one to the possibility of this syndrome. Symptoms include chemosis, extreme engorgement of conjunctival veins, proptosis, reduced vision and ocular motility, and pain. MRI, CT scanning, and angiography are diagnostic. Lack of treatment will lead to further losses in ocular function.



(above) **Angiography Showing Communication of the Carotid Artery With the Cavernous Sinus**



(left) **Engorged Episcleral Vessels**

Associated with Orbital Congestion, or with an adjacent port-wine stain as in Sturge-Weber Syndrome (see below)

## Clinical Pearl: Non-Infectious, Non-Inflammatory Causes of a Red Eye

Ocular redness typically brings to mind diagnoses such as conjunctivitis and iritis, with the typical associated symptoms. However, there are a number of ocular conditions where ocular redness is neither from an infectious cause, nor from a primarily inflammatory ocular cause such as iritis, scleritis, or episcleritis. Listed below are a number of conditions meeting those criteria:

- **Carotid - Cavernous Sinus fistula, Dural - Cavernous Sinus Fistula, or Arteriovenous Aneurysm (discussed above)** - This leads to venous congestion around the eye with often severe engorgement of conjunctival vessels and proptosis.
- **Cavernous Sinus Thrombosis**
- **Drugs** - Including vasodilating medications and alcohol, as well as ophthalmic medications, especially the prostaglandin glaucoma medications Travatan, Lumigan, and Xalatan.
- **Graves Disease** - Often leads to injection within the palpebral fissure over the horizontal rectus muscles due to edema of those muscles.
- **Sjogren's Syndrome, Scleroderma**
- **Acute Glaucoma** - especially angle-closure glaucoma or neovascular glaucoma, with an acutely elevated intraocular pressure. Usually is a flush of redness around the cornea / limbus.
- **Acne rosacea**
- **Underlying choroidal or ciliary body melanoma**
- **Ataxia telangiectasia (Louis-Bar syndrome)**
- **Hypertension**
- **Subconjunctival hemorrhage**
- **Sturge-Weber Syndrome** - conjunctival telangiectasia and episcleral engorgement often associated with an adjacent port-wine skin lesion. This may be associated with increased risk of glaucoma in the affected eye. (See photo directly above).
- **Conjunctival tumors, including:**
  - Conjunctival granuloma (may be in reaction to a foreign body, or previous chalazion)
  - Conjunctival papilloma
  - Conjunctival squamous cell carcinoma
  - Kerato-acanthoma
  - Hemangioma

## Gradual and Painless Blurring of the Vision - Cataract?

A 55-year-old man experienced painless, gradual visual loss over a 2-year period with a visual acuity of 20/30 in the right eye and 20/400 in the left eye. The examination was significant only for bilateral mild cataracts and a mildly pale left optic nerve. The vision subsequently declined in both eyes to 20/100 in the right eye and counting fingers vision in the left. Both optic nerves had mild pallor, there were mild pigmentary retinal changes, and visual field testing showed a bilateral central scotomas. Head MRI testing was normal.

The patient was felt to have progressive visual loss of central vision with an appearance of atypical retinitis pigmentosa. Important disorders in the differential diagnosis of this include cancer-associated retinopathy (CAR), melanoma-associated retinopathy, autoimmune retinopathy, compressive lesions of the optic chiasm, and toxic/ischemic optic neuropathy.

Cancer-associated retinopathy is a paraneoplastic disorder

characterized by a progressive loss of vision with signs of retinal degeneration. About half of patients with CAR have retinopathy as the first manifestation of the neoplasm. It is most often associated with small-cell carcinoma of the lung. Melanoma-associated retinopathy is typically found in patients with a known history of melanoma, and is characterized by a sudden onset of night blindness and persistent photopsia (flashing or sparkling lights). Definitive diagnosis is made by serologic and immunohistochemical analysis for anti-retina antibodies, Western-blot analysis, and indirect immunohistochemistry. After a search for a primary tumor, treatment of the retinopathy is achieved with high dose IV steroids or oral Prednisone.

In the above-discussed patient, anti-retinal antibodies were found, but no primary tumor has been located. This leads to a tentative diagnosis of autoimmune retinopathy, until a cancer or tumor becomes evident.

## Unilateral Ptosis in a Smoker

A 65 year old male, with no significant past ocular or medical history, presented with pain and burning of the right eye. He had also noted a worsening “drooping” of the right upper eyelid over the past 1-2 months. He had a history of heavy tobacco use over the past 45 years.

The examination showed a visual acuity of 20/25 in both eyes, normal intraocular pressure and ocular motility. There was 5 mm of right upper eyelid ptosis, and pupillary asymmetry. The left pupil appeared dilated compared to the right, with the right pupil being 3mm and the left 5mm. There was no APD. The remainder of the ophthalmic examination was unremarkable. The medical evaluation was significant for a worsening “raspy” voice, and shoulder pain radiating down the right arm. A Chest CT scan revealed a right apical lung tumor.

### **Pancoast tumor / Horner's Syndrome**

Pancoast tumor refers to lung cancer (usually squamous) located in the apex of the lung, extending to involve the eighth cervical and first and second thoracic nerves. This results in shoulder pain radiating in an ulnar distribution down the arm (Pancoast syndrome). A Pancoast tumor may also involve the cervical sympathetic nerves and cause Horner's syndrome (ptosis and miosis of the involved eye).

Sympathetic innervation to the eye consists of a 3 neuron arc:

**First neuron:** This originates in the dorsolateral hypothalamus, descends through the reticular formation of the brain-

*Continued on page 4. . .*

## Headache, Tunnel Vision, Nausea - Migraine?

A 46-year-old male with a history of migraine headache presented with blurred vision in especially on the right, and with a complaint of “tunnel vision”. The vision had worsened over a 12-hour period. He also had symptoms of headache, nausea, and one episode of emesis. He had no other ocular or physical symptoms, and reportedly had a history of 20/20 vision in both eyes.

The ophthalmic examination showed a markedly reduced visual acuity of counting fingers in both eyes. The pupils were mid-dilated and sluggish in reaction, and there was a right afferent pupillary defect (APD). Visual field testing

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**CT Scan Showing Large Mass in the Sella Turcica**

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- Extensive patient information, including discussion of over 80 eye conditions and a section discussing risks and benefits of laser vision correction.
- Interactive Clinical Section concerning eye disease and physical findings
- Clinical Trials Database

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*Ophthalmology Update*

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**Ptosis in a Smoker (page 3)**

stem and travels to the spinal chord. It synapses with second-order neurons between the eighth cervical and fourth thoracic vertebrae.

**Second-order neurons:** Axons from these exit the spinal cord, pass over the apex of the lung and synapse in the superior cervical ganglion of the sympathetic chain in the neck.

**Third-order neurons.** The postganglionic axons course from the neck to the eye with the internal carotid artery via the cavernous sinus. Fibers from these axons form the long and short posterior ciliary nerves of the eye.

Interruption anywhere along this pathway, including preganglionic (first or second neurons before synapse in the superior cervical ganglion) or postganglionic (after exiting the superior cervical ganglion) - will induce an ipsilateral Horner's syndrome. The lack of sympathetic innervation leads to a mild to moderate upper eyelid ptosis and pupillary constriction (more noticeable in the dark).

Other causes of Horner's Syndrome include cluster headache, cavernous sinus lesion, trauma, aneurysm, herpes zoster (postganglionic causes); Pancoast tumor, tuberculosis, carotid or aortic artery dissection (preganglionic causes); and central causes such as multiple sclerosis, CVA, or pituitary tumor.

**Migraine? (page 3)**

showed a bitemporal hemianopia and inferior altitudinal defects in both eyes. Intraocular pressure, ocular motility, anterior segment exam, retinal exam, and optic nerve exam were normal.

A CT scan was ordered, which showed a large mass in the Sella Turcica. A diagnosis of pituitary apoplexy was made, and the patient was referred for immediate neurosurgical consultation and the tumor was resected. Postoperatively, the vision returned to 20/40 on the right and 20/25 on the left, with improvement in the scotomas, but with the development of optic nerve atrophy.

Pituitary Apoplexy is an important cause of bilateral visual loss. It is defined as an abrupt pituitary hemorrhage, usually into a non-secreting pituitary adenoma. Symptoms include headache (often with nausea and emesis), blurred vision, possible ocular mobility disturbances due to impingement on the cranial nerves 3,4, or 6.

The main differential diagnoses include aneurysmal subarachnoid hemorrhage, meningitis, intracerebral hematoma, encephalitis, retrobulbar optic neuritis, brain stem infarction, temporal arteritis, migraine (with or without ophthalmoplegia), and cavernous sinus thrombosis. Timely imaging studies and treatment are necessary for survival and to preserve vision.