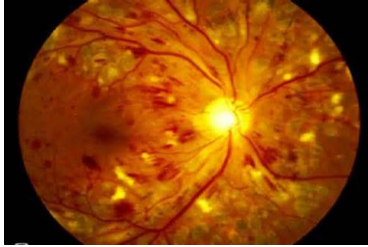


Technicians & The Anatomy of Systemic Eye Disease



medicaltextbooks.blogspot.com

Diabetes: Type I & II

- One of the leading causes of blindness in the world
- It is recommended that patients with **Type I** diabetes be referred *within* (3) years of their diagnosis, and then annually.
- Patients with **Type II** diabetes should be examined at the time of their diagnosis and then annually.

Diabetic Retinopathy

Type I (Insulin Dependent Diabetes Mellitus)
* also known as Juvenile Diabetes
Body produces *no* insulin

Type II (Adult Onset Diabetes Mellitus)
* non insulin dependent diabetes
* insulin is being produced but the body is not utilizing it correctly

Gestational Diabetes

Diabetes can be particularly aggressive in pregnancy. Pregnant women should be examined in the first trimester and at least every (3) months until delivery.



Layers of the Retina

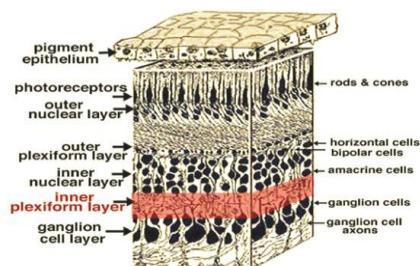


Fig. 7. 3-D block of retina with the inner plexiform layer highlighted (red).

webvision.med.utah.edu

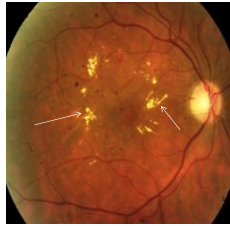
Nonproliferative: Background Diabetic Retinopathy (BDR)

Progressive micro-angiopathy characterized by small vessel damage and occlusion.



Capillaries develop small "dot blot" hemorrhages at their ends. Some hemorrhages can be flame shaped as well. Macula edema causes decrease in vision.

Small, yellow circular areas also begin to occur. These are *lipid exudates* ("hard exudates")

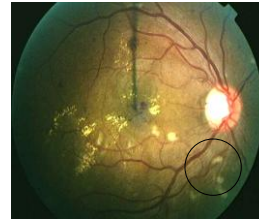


that can form around micro-aneurysms. They are located more in the temporal portion of the **macula**.

illnessretinainstitute.com

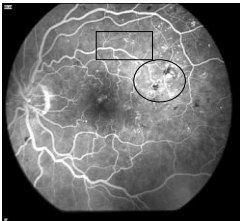
Preproliferative Diabetic Retinopathy (PDR)

The most common finding as the disease continues to progress are **cotton wool spots**



& dilation of the capillary bed. *Ischemia* begins (decrease blood flow) especially near the macula area.

Angiography begins to show *capillary nonperfusion* (filling of the capillary beds).



Flourescein will leak from the vessels. In this view, hemorrhages are seen as black and micro-aneurysms see as white.

Proliferative Diabetic Retinopathy (PDR)

Progressive ischemia causes the growth of new blood vessels. These vessels are very weak and leak serum proteins.

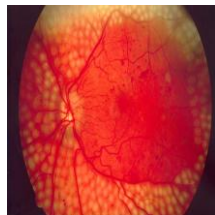


Neovascularization begins at the disc as well as the iris. Vitreous hemorrhages also begin.

imgarcade.com

What Do We Do ?

Pan Retinal Photocoagulation (PRP) is recommended at this point. Hundreds of laser burns try to seal these leaking new vessels to prevent further bleeding and growth.



rustoneyeinstitute.com

When these patients call - what do I need to do ?

Listen to what they are telling you !

- Floaters (may be accompanied with flashes)
- "Sudden" loss of vision
- Curtains coming down/up
- Spot missing when I try to read
- "My vision is red or pink"

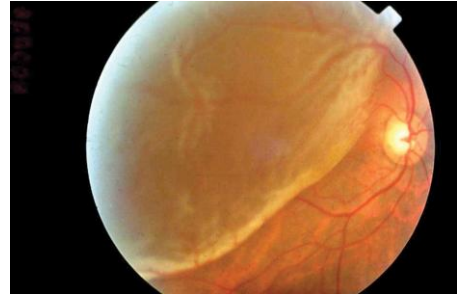
GET THEM IN TODAY FOR A DILATED EXAM!

"Flashes"

Usually occur in a **dark** setting or if patient is in bed with eyes closed. They will often say they thought there was a storm occurring during the night !



Retinal Detachment



celjournal.org

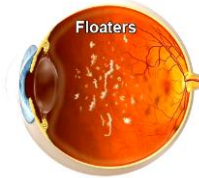
"Floaters"

Occurs in **light** settings. Patients will tell you it is like a "mosquito" (because they move) in their vision, their glasses are always dirty or there is a hair in the way of their vision.



avserver.lib.uthsc.edu

Floaters caused by red blood cells stuck in vitreous casting shadows on the retina



Traction detachment from vitreous syneresis



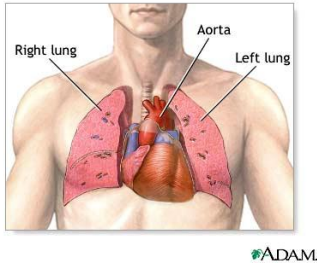
imagebank.casrs.org

Vitreous Hemorrhage



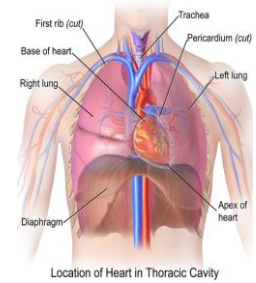
You have no idea how they see until you see them !

Heart & Vessels

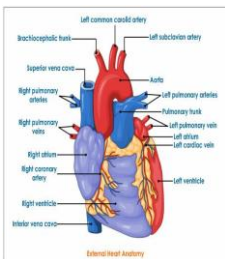


Heart: Location

- Size of a fist
- Hollow
- Cone shaped
- Weighs *less* than a pound
- Rests in the middle cavity of the thorax (**mediastinum**)



Aorta



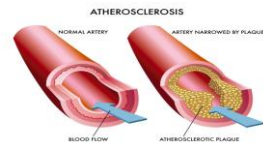
Largest **artery** in the body. About the size of a garden hose (internal diameter the size of your thumb).

Cardiovascular Diseases of the Eye

Atherosclerosis: process where the walls of the heart vessels begin to thicken. It does not take much to close the vessel (clot).

Aorta and coronary arteries are the most susceptible although this can happen to *any* blood vessel.

Platelets will try to line these vessels to protect them from further damage. Fat and white blood cells begin to accumulate, causing the walls to protrude. Eventually, evolves into **arteriosclerosis**.



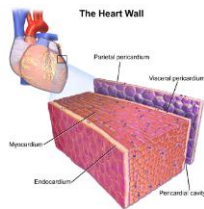
Heart Problems

Endocarditis: bacterial infection

Valve stenosis: stiffness of the valve flap usually due chronic infection

Angina: myocardium is deprived of oxygen resulting in chest pain

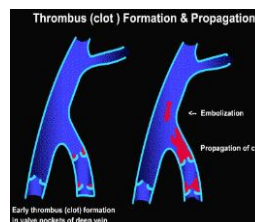
Myocardial infarction: "heart attack" due to heart cells dying



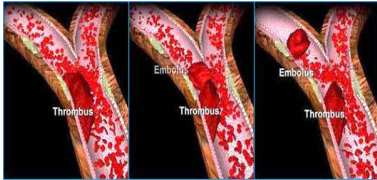
Clotting Problems

Thrombus: a clot that develops in a blood vessel. Can prevent blood

flow to the area. *IF* the thrombus breaks away and flows freely, then it is called an **embolus**.



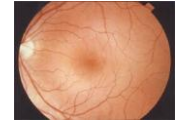
Embolus: a thrombus that has now broken free and is moving. EX: a cerebral embolus may cause a stroke.



strokecenter.org

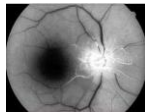
Central Retinal Artery Occlusion (CRAO)

Painless vision loss that occurs over seconds. Patient may have a transient loss of vision (*amaurosis fugax*). MD needs to listen to the patient's neck for **bruit**. Vision loss may be CF or HM. + APD see as well.



imagebank.aars.org

The retina becomes opacified except the fovea. The fovea is nourished by the choriocapillaris and is spared. Common causes: emboli from cardiac sources or arteriosclerosis.



Amaurosis Fugax

Amaurosis is commonly caused from an **emboli** to the retina in one of these ways:

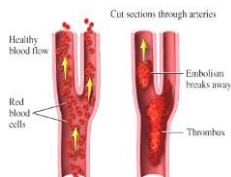
- Cholesterol emboli:** *Hollenhorst plaque* from the carotid artery.
- Calcific emboli:** from damaged cardiac valves. Solid emboli usually in younger patients with cardiac lesions



tedmontgomery.com

Branch Retinal Artery Occlusion (BRAO)

Different from CRAO as an **emboli** gets stuck in an artery branch causing a part of the visual field to be lost.

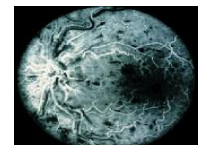
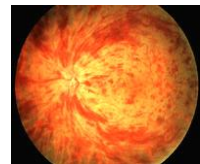


Central Retinal Vein Occlusion (CRVO)

Sudden, painless loss of vision. Most patients (50) or older. More than half have cardiovascular disease. Vision reduced from macular edema.

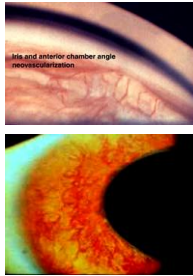
Complications:

- macular edema
- secondary neovascular glaucoma



studyblue.com

Approx. one half of eyes with CRVO will go on to develop **neovascular glaucoma**. If it develops, PRP is needed to stop the progression of new blood vessels.

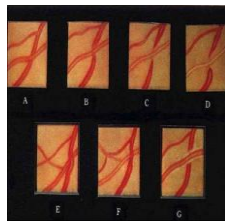


Branch Retinal Vein Occlusion (BRVO)

Sudden, unilateral vision loss to a *segment* of the visual field. Vision may be impaired if there is macular edema, Ischemia (inadequate blood supply) or vitreous hemorrhage. PRP may help to prevent neovascularization.



The occlusion **always** happens at the site of an *arteriovenous crossing*. Patient needs a workup for hypertension and other arterial disease processes.



netclass.cmu.edu.cn

Pediatric Systemic Illnesses

Dealing with children and their illnesses is often difficult at best. Symptoms are often nonspecific. A child's visual pathway continues to develop well into their first decade of life. Many systemic congenital diseases are seen in the eye - so it is very important to see these children to assess not only their eyes but the health of the entire body.



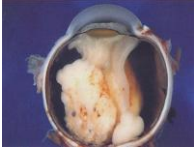
What Do We Hear From Parents ?

- My child cries but there are no tears (?? obstruction in the nasolacrimal system or developmental)
- My child's eye turns in or out (? strabismus or tumor)
- My child has matter in their eye all the time (See # 1 or has infection or ???)
- They sit too close to the TV (? Refractive or just being a kid)

- Their pupil looks funny (? Retinoblastoma or developmental anomaly of pupil or cataract)
- They're not reading well so it must be their eyes (?? Dyslexia, question learning problems or refractive)
- "My child is very sensitive to light" (congenital glaucoma or cornea problem)

Retinoblastoma

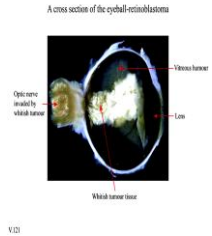
Rare. Malignant. Can be life threatening.
2/3rds of cases appear before the age of
(3)y.o. Bilateral disease 30% of the time.
Inheritable disease.



bombayoculoplastics.com

A retinoblastoma gene is present in every person, but it is *suppressed*. When that cell mutates, the tumor begins. Survivors of this form have a 50% chance of producing a child with retinoblastoma. The tumor can grow inward or outward.

Both forms will fill the optic nerve to the brain. They can "seed" into the vitreous. The tumor usually grows unnoticed until the child presents with a "white pupil".



VID

Signs to look out for



A white reflection in the pupil



A squint, where one eye looks in the other



A squint eye with white reflection in the pupil



A redness or swollen eye without infection



Swollen eye



Strabismic eye

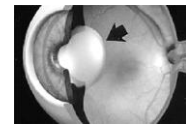
Enucleation is the treatment for advanced unilateral tumors. In bilateral tumors, radiation therapy and photocoagulation are used to preserve the less severely affected eye.

rb.cankidindia.org

Congenital Cataract

More common than you think. Often visually insignificant. **IF** they become dense **centrally**, then they need to be removed.

Unilateral, dense, central cataracts 2 mm or larger can cause permanent **sensory deprivation amblyopia** if not treated within the first (2) months of life.



Congenital Glaucoma

Rare. Can be caused due to developmental issues or a variety of anomalies:

- * Sturge - Weber
- * Peter's anomaly
- * congenital rubella
- * Axenfeld's syndrome



50% of infants will manifest this at birth, 70% are diagnosed in the first (6) months of life and 80% are diagnosed in their first year of life. Earliest symptom is **epiphora (tearing)** as well as **photophobia**. Corneal ulcers can occur. The child usually presents with a **megalocornea**. If left untreated, the child may go blind at a very early age.



Tumors

Tumors or cancers may be seen in their earliest stages during a routine eye exam. The patient may complain of blurry vision (if the macula is involved) or even present with a secondary retinal detachment. There is no pain.



oncarnetwork.com

Malignant Melanoma

The most common cancers that metastasize to the eye are from the breast (women), lung or prostate (men). Tumors can be treated with systemic chemotherapy (which is also fighting the primary tumor). Radiation can also be used.



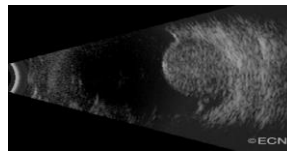
bedecid.com
hdsakr/fet.no

Choroidal Melanoma: This tumor is the most common tumor that originates in the eye. Age (55) y.o. or older. Believed to arise from a benign nevus. This type of tumor can be treated with radioactive plaque therapy. The plaque looks like a flattened penny with a bump in the center.



gveeyes.com

Radioactivity is focused directly onto the wall of the eye, and not at the structures around it. Plaque is "sewn" onto the sclera for several days then removed.



eyecancer.com

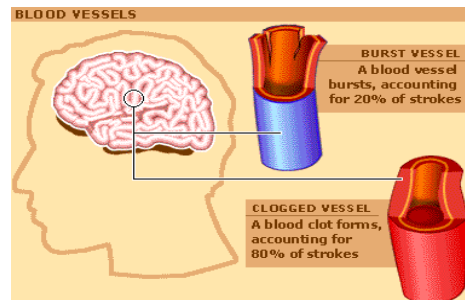


Neurological Disorders

- Stroke
- Multiple Sclerosis
- Tumors & Facial palsies
 - a. ??? Diabetic 3rd nerve
 - b. Bell's Palsy
 - c. Stroke



Cerebrovascular Accident "Stroke"



LEFT CVA

- Paralyzed Right Side Hemiplegia
- Impaired Speech and Language
- Slow Performance
- Visual Field Deficits
- Aware of Deficits Depression, Anxiety
- Impaired Comprehension

Left brain damage...Right body weakness

What do you eat with a spoon?

2+2=5?

RIGHT

studentnurse3.blogspot.com

- 3rd leading cause of death in the US
- Occurs when circulation to the brain is blocked (either by a clot or a ruptured blood vessel). The lack of blood causes the brain to die.
- Can be "incomplete". **Transient ischemic attack (TIA)** last approx. 5 - 50 minutes with characteristics of numbness, impaired speech, temporary paralysis and then the symptoms improve.

Visual Field Loss in Stroke Patients

What It's Like

This is how a street scene looks with normal vision.

Example of a hemianopia

simhealth.net

ctrainceu.com

Hemianopia

Left Eye Right Eye

eyesearch.ucl.ac.uk

Multiple Sclerosis

Autoimmune disease. The body destroys the **myelin** (fatty protective covering surrounding the nerves in the brain and spine) causing messages being transmitted to be Delayed, "garbled" or to be not sent at all.

mayorshhealthline.wordpress


Symptoms

- 80% will c/o disturbances in sensitivity, paralysis or spasticity
- 60% will c/o disturbances of the bladder and eyes
- Ages 20 - 40 y.o. will present with optic neuritis (**retrobulbar neuritis**)

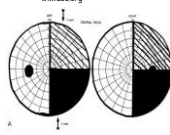
Brain Tumors

In **children**, most brain tumors are **primary** tumors (originate in the brain).
 In **adults**, most tumors are **secondary** (coming from another site). In adults, they usually metastasize from the lung, breast or other areas and are not called a *brain tumor* - but are called the location of where the tumor came from.

Temporal Lobe Tumor:
 patient may complain of superior quadrant field loss



Parietal Lobe Tumor:
 patient may complain of inferior quadrant field loss



wikidoc.org
 cybersight.org

Bell's Palsy **Stroke** **Diabetic 3rd**



Hallucinations

