

Meet the Choroid

Joseph J. Pizzimenti, OD

pizzimen@uiwtx.edu

GOAL

The goal of this presentation is to provide useful clinical information on the pathogenesis, diagnosis, and treatment/management of diseases that involve the choroid.

OBJECTIVES

At the conclusion of this course, the participant should be able to:

1. Discuss the functional anatomy of the choroid and outer retina.
2. Describe the most common diseases of the choroid and outer retina.
3. Diagnose and manage choroidal and outer retinal conditions, using scanning lasers (OCT), echography, and other imaging technologies when appropriate.
4. Apply new knowledge about the pathogenesis, work-up and management of choroidal and outer retinal conditions.
5. Describe the pathogenesis of choroidal neovascularization.
6. Better recognize malignant neoplastic disease of the choroid.

ABSTRACT

The choroid is both a pigmented and vascular tissue. Its main function is to nourish the outer retina. Choroidal blood flow, which is as great as in any other organ, may also cool and warm the retina. This course discusses disorders of the choroid, from infection and inflammation to various malignancies.

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Course Outline

Goals for This Course

- Functional anatomy review
- Choroid
- Choroid examination and evaluation
- Case examples
- Interactive

The Choroid: Structure, Function, and Evaluation

- Located between the sclera and the RPE
- Extends from ora serrata to optic nerve
- Pigmented/vascular tissue .75mm thick
- Nourishes the RPE
- Choriocapillaris designed to leak
- Absorbs light that passes through retina

The Choroid: Structure, Function, and Evaluation

- Loose connective tissue
- Melanocytes
- Choriocapillaris
- Fenestrated endothelium allows diffusion of proteins
- S_____ regulation
- High blood flow
- Very little O₂ extracted, so high venous O₂

Bruch's Membrane

- Basal lamina of RPE
- Anterior collagenous layer
- Elastic layer
- Posterior collagenous layer
- Basal lamina of CC endothelium
- Contamination of Bruch's can result in d_____, CNVM

Choroidal Vasculature

- SPCAs provide blood flow to choroid posterior to equator
- ACA and LPCA supply anterior choroid
- Vortex veins drain choroidal veins
- V.V. drain into sup, inf ophthalmic vein

Retinal Vasculature

- 2 main sources of blood supply:
- Choroidal BV
- Supplies outer retinal layers, including PRs
- CRA
- 4 branches nourish inner retina
- Run radially toward fovea

Fluorescein Angiography (FA)

- FA answers the question: is the blood-retinal barrier intact?

The Fluorescein Angiogram

- Stages
- Choroidal phase
- Arterial phase
- Laminar venous phase
- Venous phase
- Recirculatory phase
- Late phase

Indocyanine Green Angiography ICGA

- Uses digital imaging systems
- Dye properties
- “sees” through blood
- Delineates choroidal circulation better than fluorescein angiography
- Boundaries of occult membranes imaged

Echography: A-scan, B-mode (Choroidal Melanoma)

Optical Coherence Tomography

- En face advanced visualization
- Enhanced depth imaging (EDI)
- Swept-source
- OCT Angiography

Case

- 61 y.o Black female
- CC: referred for evaluation of “retinal cysts”
- POHx: Unremarkable
- PMHx: + HTN/Hypercholesterolemia
- Medication: Atenolol, Maxzide

Ocular Examination

- Best-corrected VA: 20/20 OD, 20/20 OS
- Pupils: Equal & round –APD
- EOM/CVF: Unremarkable

- SLE: Unremarkable

Differential Diagnosis

- Idiopathic Central Serous Chorioretinopathy
- Choroidal hemangioma
- Choroidal tumor
- Diabetic Maculopathy
- Idiopathic juxtafoveal retinal telangiectasia
- Sickle cell Retinopathy
- Vascular occlusion
- Wet ARMD
- Hypertensive Retinopathy

Polypoidal Choroidal Vasculopathy (PCV)

- Recurrent subretinal and subretinal pigment epithelium
- Serosanguineous Detachments

Polypoidal Choroidal Vasculopathy

- First described in 1982

“posterior uveal bleeding syndrome”

“multiple recurrent retinal pigment epithelial detachments in black women”

Clinical Features of PCV

- Aneurysmal structures at the termination of a network of dilated choroidal veins
- Recurrent hemorrhagic/exudative detachment of the retinal pigment epithelium (PED)

Pathogenesis of PCV

- Inner Choroid
- Network of branching vessels with terminal aneurysmal red spheroidal dilations (polypoidal lesions)
- Dilated, thin-walled vessel of the choriocapillaris

- Within intra-Bruch's membrane
- Recurrent hemorrhage and leakage
- variants of inner choroidal neovascularization (CNV)

Indocyanine green angiography in PCV

OCT-Evaluation

- Usually bilateral
- Chronic relapsing-relapsing course
- Peripapillary region most affected
- Chronic, recurrent PED and neurosensory detachment
- Serosanguinous (serum and/or blood)
- Good visual prognosis
- PCV in the macular region-often affects vision irreversibly
- Higher incidence in dark pigmented people
- African American, Hispanic, and Asian
- Predilection for African American women
- Average age is 60

AMD/ PCV

- The features that distinguish AMD from PCV include:
- White race
- Macular location
- Presence of drusen
- Frequent recurrence
- Rapid rate of progression
- Disciform scarring
- Poor visual prognosis

PCV and systemic disease

- Concomitant systemic microvascular diseases

Treatment

- Conservative management/treatment
- Observation: Spontaneous regression
- Longstanding non-progressive exudation
- Control underlying systemic condition
- Photocoagulation
- PDT
- Role of anti-VEGF meds

Choroidal Malignancies

Uveal Metastatic Lesions

- Most common intraocular tumor
- Number one primary site in women is the breast, in men it is the lung
- Choroid around 90%, ciliary body about 8%, iris 1-2%

Uveal Metastases

- Located in posterior pole (blood supply)
- Unilateral or bilateral (unilateral 3 to 1)
- Breast metastases most likely to be bilateral: lung unilateral
- Single lesion or multiple lesions
- RPE detachments

Management of Metastatic Tumors

- Metastatic lesions tend to be detected sooner because their posterior pole location leads to earlier symptoms
- Systemic work-up is critical
- Average survival time of 9 months after Dx

Differential Diagnoses of Metastatic Tumors

- Primary uveal melanomas
- Hemangiomas
- Osteomas
- Posterior scleritis
- Inflammatory disorders

Primary Uveal Tumors

- Unilateral & solitary
- Pigmented but may be amelanotic
- Relatively elevated
- Can break through Bruch's membrane..."Collar Button"
- Rare in non-Caucasians (C 19 X AA; H 5x AA)

Primary Uveal Tumors

- Can metastasize, but rarely have by the time they are detected in the eye
- Systemic work-up a must, but not common to find metastases at time of diagnosis
- Most frequent site.....75%.....is the liver
- 2X risk of colon cancer compared to general population

COMS and other studies

- Five-year survival rates for.....

Primary choroidal melanoma

Treatment side effects

- Main side effect of focal ocular treatment is.....

Melanoma

Another RR example

Pearl

- Rapid shrinkage of the tumor with treatment may be bad news.....indicates substantial malignant (and metastatic) potential

Questions?

Summary and Conclusions

- The choroid is both a pigmented and vascular tissue.
- Normal choroid function results in proper blood supply to outer retina.
- Like other ocular tissues, the choroid is susceptible to disease processes that are sight-threatening and, in some cases, life threatening.
- Optometrists are in a position to save vision, and even save a life!