Ocular Examination
FRONT TO BACK
Vitreous/Peripheral Retina Pathology

Lecture 8
Examination Tools

• History
  – Photopsia
    • Seeing flashes of lights
  – Floaters

• Slit lamp
  – Dilated
  – Low magnification
  – High illumination
  – Consistency
  – Incomplete vs Complete PVD

• 78D lens
• Goldmann 3-mirror
• Direct ophthalmoscope
• BIO
  – Scleral Depression
    • video
Vitreous

- Avascular and inelastic
- Comprises 2/3 of ocular volume
- In children, consistency of “egg white” with fine fibril density (mesh-like)

9 month old vitreous - Sebag (2002)

6 year old

Hyalocytes

Extremely dense cortex

Vitreous do NOT hold globe into round-shape !!!!
Vitreous

• Composition
  • 99% water/0.9% salts/0.1% protein and polysaccharide components
  • Highly-hydrated double network of protein fibrils
  • Charged polysaccharide chains
  • Hyaluronic acid, inorganic salts, sugar and ascorbic acid
Vitreous

Cloquet’s canal

What’s this?

Vitreous Base

Posterior retina

Subhyaloid space

Peripheral retina = anterior retina
Extremely important to know “Normal”
DO NOT overlook the vitreous!!!!!!!
Who is good for this???????
Vitreous

- Loosely attached to retina except in specific spots (where ILM is thinnest)
  1. Vitreous base
  2. Optic nerve head
  3. Course of the major retinal vessels
  4. Macula
• Runs circumferentially around eye within 1-2DD of ora serrata

• Extends 2-4mm posterior to ora serrata and 2mm anterior

• Collagen fibrils align perpendicular

• Traction usually transmitted to the peripheral retina

1. Lens
2. Ora serrata
3. Sclera
4. Ciliary body
5. Pars plicata
6. Pars plana
Vitreous

• Loosely attached to retina except in specific points

1. Vitreous base
2. Optic nerve head
3. Course of the major retinal vessels
4. Macula
   – Weakens with age
   – Anomalous PVD
     – Sebag, J, 2004
Vitreous

• Along areas of chorioretinal scarring
• Along edges of lattice degeneration
• Vitreoretinal tufts
Symptoms of Vitreous Pathology

- **None**
- **Floaters**
- **Photopsia**
  - Perceived flashes of lights
- **Decreased BCVA**
- **No pain**
- **No APD**
- **No EOM restrictions**

Causes:
- Posterior Vitreous detachment (PVD)
- Migraine with ocular aura
- Ocular aura without migraine
- Retinal break
- Retinal detachment
- Occipital lobe infarction
What can go wrong?

• **Vitreous**
  – Congenital abnormalities
  – Asteroid hyalosis
  – Inflammation
  – Neovascularization
  – Hemorrhage
  – Tobacco dusting or Shafer’s sign
  – Syneresis
  – Posterior Vitreous Detachment (PVD)
  – Vitreoretinal interaction
    • Peripheral Retina
    • Macular

Key to vitreoretinal pathology
MY CLINICAL POINT

• Extremely difficult to separate vitreous pathology from retinal pathology, hence the term vitreoretinal “traction” pathology
  – Tractional retinal detachments
  – Rhegmatogenous retinal detachments (III. Risk factors in supplemental material)

Observations......
• Mittendorf’s dot
  – Small portion of hyaloid artery did not regress

• Bergmeister's papillae
  – Anomaly only
• Persistent hyaloid artery

Pictures one and two: observations........

Hint: Look at retina
• Asteroid Hyalosis
  – Globules of calcium soaps aggregate on vitreous fibrils
• Shafer’s sign
  – “Tobacco dusting”
  – Pigment cells within posterior lenticular space (Berger’s) and anterior vitreous
  – Retinal detachment until otherwise proven
  – Significant negative in vitreoretinal pathology
• Inflammation
  – Vitritis

• Neovascularization

Fibrotic material
• Hemorrhage

Observation between 1-2 and 3........
Vitreous Hemorrhage
• Vitreous tuft
Aging Vitreous

• Fibrillary degeneration
  – 5 years of age
  – Definitely see it after 40 years of age
  – Mild hyaluronate dissociation from the collagen fibrils
    >> larger collagen fibers
  – Creates pockets of saline and hyaluronate, called liquefied vitreous
  – Shrinkage of vitreous
• Syneresis
  – Liquefaction
  – Hydrophobic collagen fibrils clump together
  – Lacunae
    • Pockets of water and Hyaluronic acid

Question: If you could focus on that lacunae with a slit lamp, What would you see???
Posterior Vitreous Detachment

• Defined: Separation of the posterior vitreous cortex from the internal limiting lamina of the retina
• Posterior Vitreous Detachment (PVD)
• Weiss ring = complete PVD
  – Remnant of cortex attached to ONH

Patient’s entering complaint????

Enter stage right:

Peripheral Retina
Peripheral Retina

- Anterior to vortex vein ampulla
- Extends to ora serrata
  - Serrations more prominent nasally
- Two DD (3mm)
- Arterioles and venules extremely difficult to differentiate
  - Same size, color and pattern
  - Trace back posteriorly
BIO Landmarks

- Ciliary Body
- Pars Plicata
- Pars Plana
- Vitreous Base
- Ora Serrata
- Retina
• **Vortex Vein Ampulla**

Vortex Vein Varix
Normal bump
• Long ciliary nerve
• Prominent vitreous base
  – White without pressure

• White without pressure
• Paving stone degeneration

• Cystoid degeneration
• Reticular pigment degeneration
• Equatorial drusen
• Congenital Hypertrophy of the RPE (CHRPE)

• Bear Tracks
What can go wrong?
Vitreoretinal Pathologies

• Peripheral Retinal Breaks
  – Atrophic retinal hole
  – Operculated retinal holes
  – Retinal tears
    • Horseshoe

• Retinoschisis

• Rhegmatogenous Retina Detachment
  – Risk factors outline supplement III

• Lattice degeneration
  – Without pigment
    • Snail track
  – With pigment
    – Without atrophic holes
    – With atrophic holes
    – With linear tear

• Retinal Dialysis
Retinal Breaks

- **Defined**: Any full thickness disruption in the sensory retina providing a conduit for fluid to enter the potential space between the sensory retina and RPE
- 5-15% of the general population have {peripheral} retinal breaks
  - Benign atrophic holes
Atrophic Retinal Holes

• Develop **without** vitreoretinal tractional forces
  – retinal thinning

• Generally stable for long periods
Operculated retinal holes (tears)

• Indicates past &/or present vitreoretinal traction
• Retinal tissue floating above the break
  – Operculum can be seen as a whitish, disc shaped floater over the retinal break
• Generally stable over long periods of time

Note the edematous cuff

Operculum indicates relief of vitreoretinal traction?
Operculated hole with edematous cuff

Observations........

Hint: The darkly pigmented ring
Classic Horseshoe Tear
AKA Flap Tears

- Sensory retina *incompletely* pulled from the RPE
- Apex of the tear attached to mobile vitreous
- Apex toward the posterior pole
  - Base of the triangle parallels the vitreous base
- Can exists in any region of the peripheral retina
  - Look carefully in mid-periphery
Retinal Tears
Mongo (real) retinal tear

Question: What color is the retina?
• Observations.....

POINT: if see peripheral retinal hemorrhages-MUST rule out retinal break !!!!!!!!!!!
• Retinal Dialysis
  – Retinal tear at the ora serrata
  – Trauma
• Eye [2004] M. Singh
Lattice Degeneration

- Snail tracks
  - Lattice w/o pigment
Lattice without Retinal Breaks

Pigmented 82%
Lattice with Atrophic Retinal Holes
Lattice with Posterior Linear Tear
Treatment
Rhegmatogenous Retinal Detachment

- **Rhegmatogenous**
  - Caused by retinal break
    - Horseshoe tear
    - Lattice degeneration
      - Myopes
Note: The demarcation lines

Retinal tear
Scleral Buckle
Retinoschisis

- A splitting of the sensory retina at the outer plexiform layer
  - Less common inner nuclear layer
- May have inner or outer holes
  - Increase risk of progression
- Causes absolute field defect

Observations.......

Hint: where did the inferior vessel go????
Note: some retina above and some retina below the blister
Test: Which is Which: RRD/RS