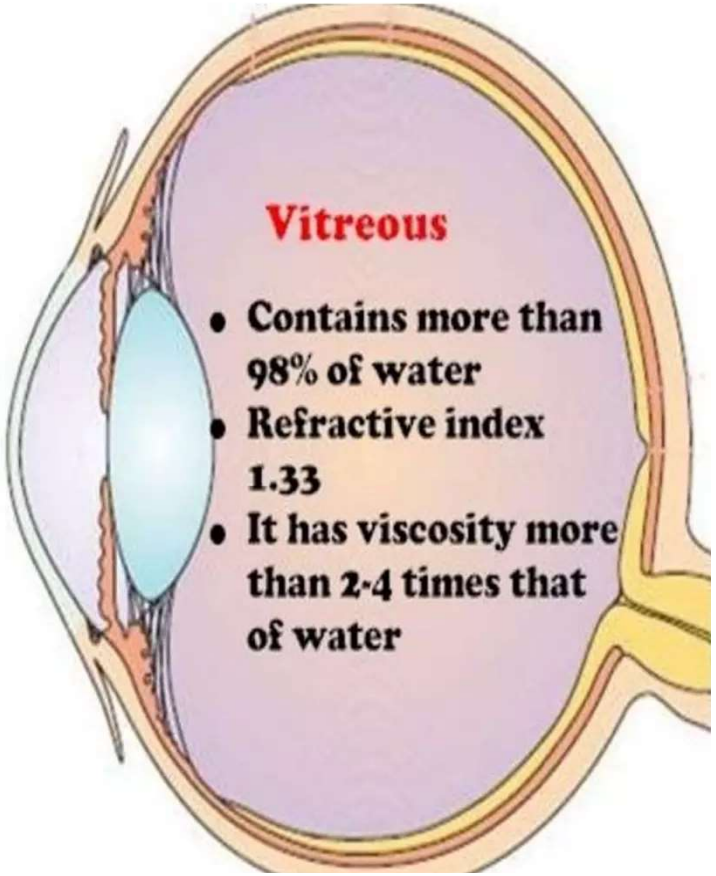
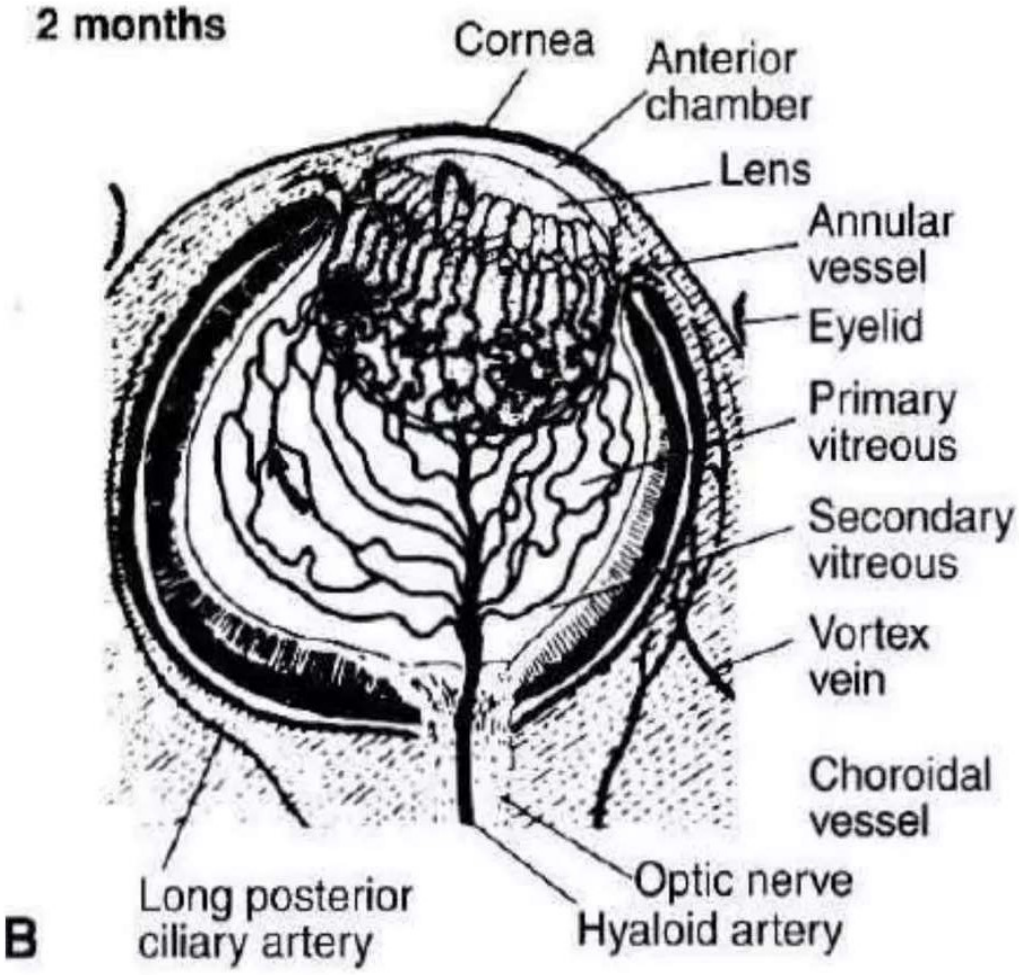
Introduction

- The word “vitreous” is derived from a Latin word “vitrum” which means **glass**
- It's Clear, transparent, gel-like liquid fills the vitreous cavity of the eye
- vitreous is a dilute solution of salts, soluble proteins, and hyaluronic acid contained within a meshwork collagen.
- Spherical in shape, volume 4ml and weight 4gm



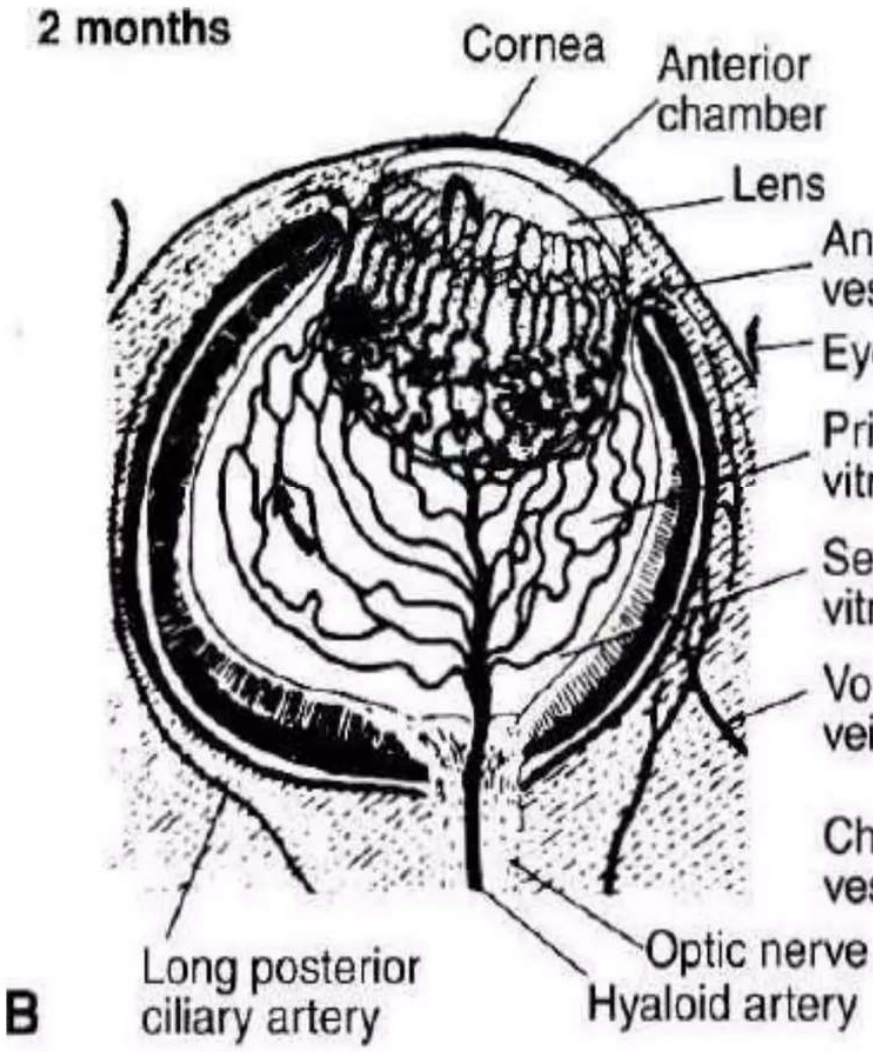
primary vitreous consists

- Fibrils -ectodermal origin
- Mesenchymal cells-- mostly mesodermal in origin some are derived from neural crest cells
- Vascular channels of the hyaloid system-- mesodermal origin



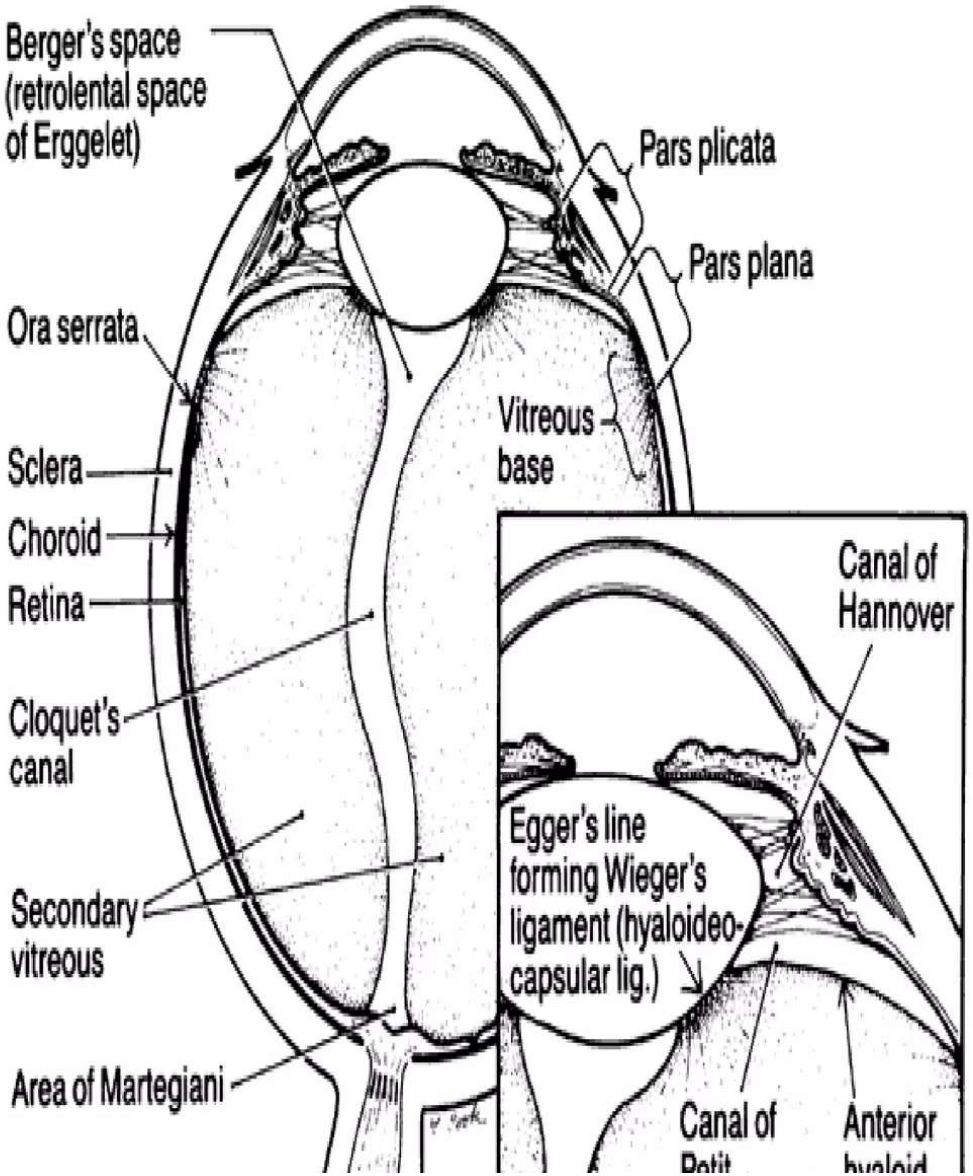
Secondary (definitive) vitreous

- occurs during the 7th to 8th weeks, after closure of the optic fissure
- Consists of:
  - A finer, more compact fibrillar network of monocytes
  - The primitive hyalocytes - originate from the vascular primary vitreous (mesenchyme)
  - Collagen fibrils - are produced by the hyalocytes and result in expansion of the secondary vitreous volume
  - Small amount of hyaluronic acid



Tertiary vitreous

- ✓ Between **3rd and 4th** months of gestation, collagen fibrils of the secondary vitreous condense
- ✓ The condensation of fibrils extends to the lens equator and constitutes the tertiary vitreous.
- ✓ The zonular apparatus of the lens ultimately develops anterior to these collagen fibrils
- ✓ At the **6th and 7th months** of GA the vitreous regresses to its base on the pars plana and to its attachment to the lens which is called the **capsulohyaloid ligamet**



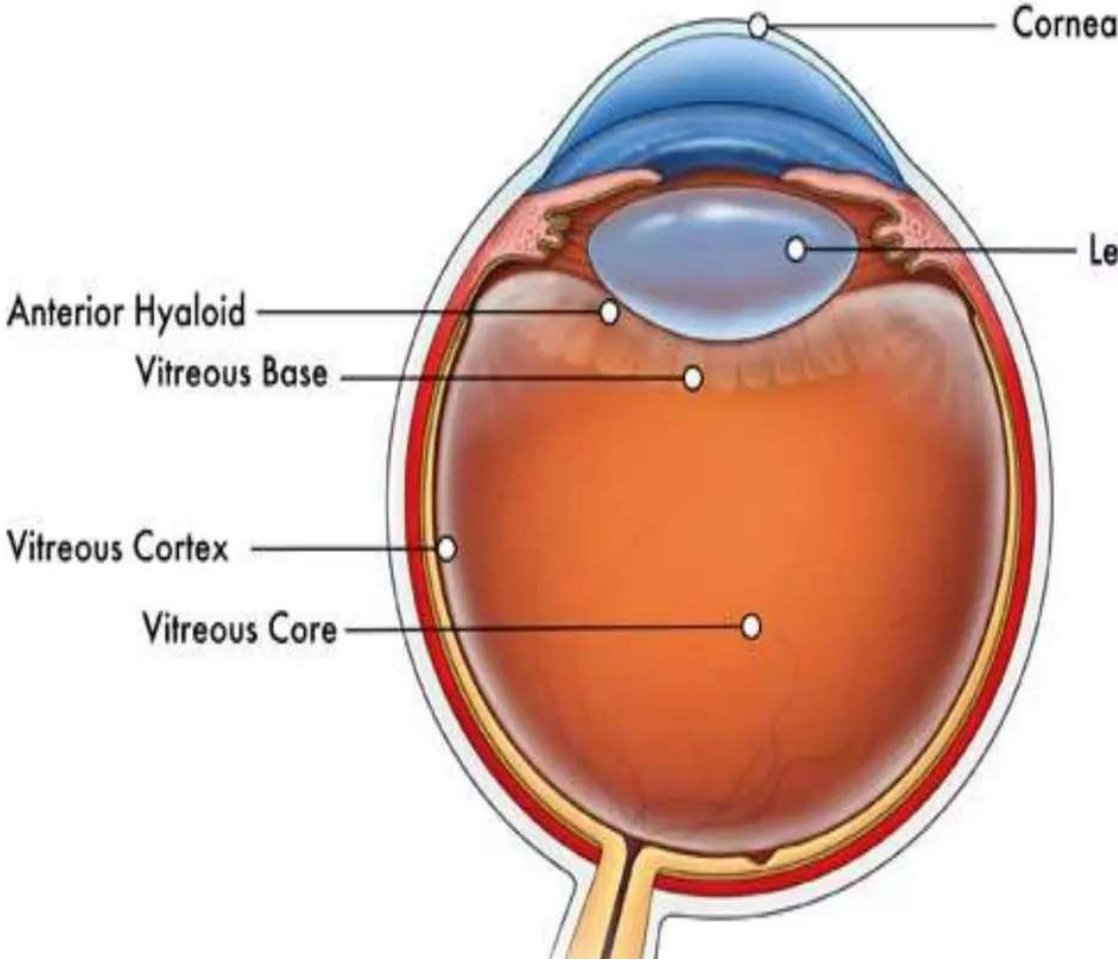
Gross Anatomy

Composed 2 main portions:

- The central, or medullary vitreous
- The cortical vitreous- outer portion

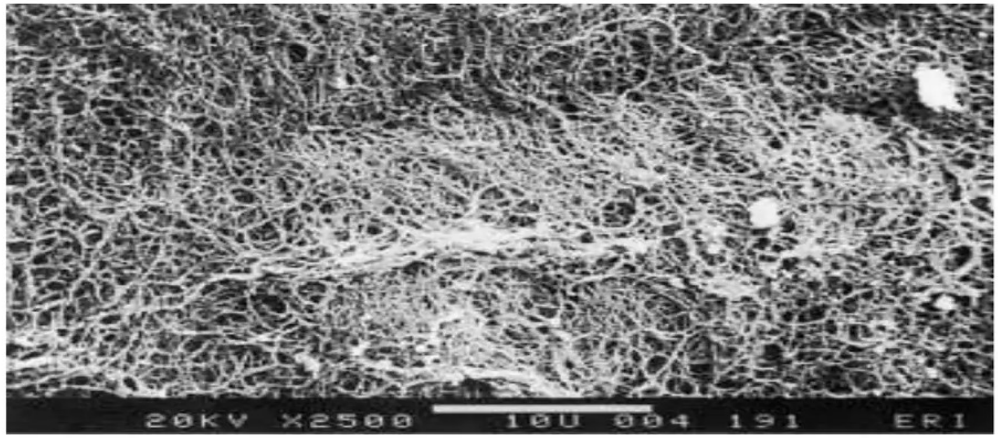
The cortical vitreous further divided

- Anterior vitreous cortex
- Posterior vitreous cortex



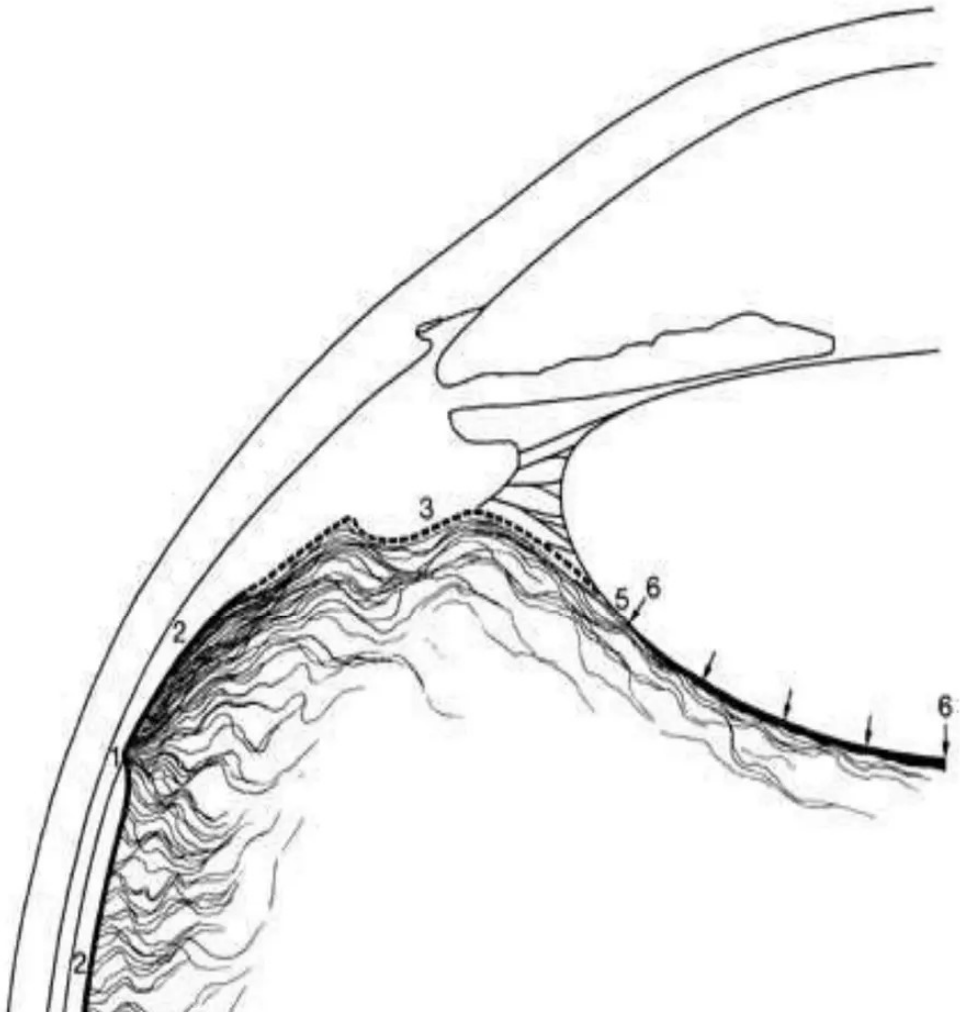
Cortical Vitreous

- The peripheral '**shell**' of vitreous
- Only 2% of total Vitreous volume
- Consists of more **condensed** collagen fibers, cells, proteins & mucopolysccharides
- **Metabolic center** of Vitreous , b/c It contains cells; Hyalocyte, Fibrocytes



Anterior Vitreous Cortex

- Also called Anterior Hyaloid Face
- Anterior to the vitreous base
- Begins **1.5mm** anterior to **Ora Serrata**
- Collagen fibrils densely packed and parallel to surface of cortex



Anterior Vitreous Cortex cont'd

- **Smooth surface/membrane like** appearance due to **lamellar** distribution of **cortical fibers** and associated highly polymerized mucoproteins

- Form **posterior limits** of posterior chamber, serves as Communication port b/n Vitreous cavity and Aqueous humor

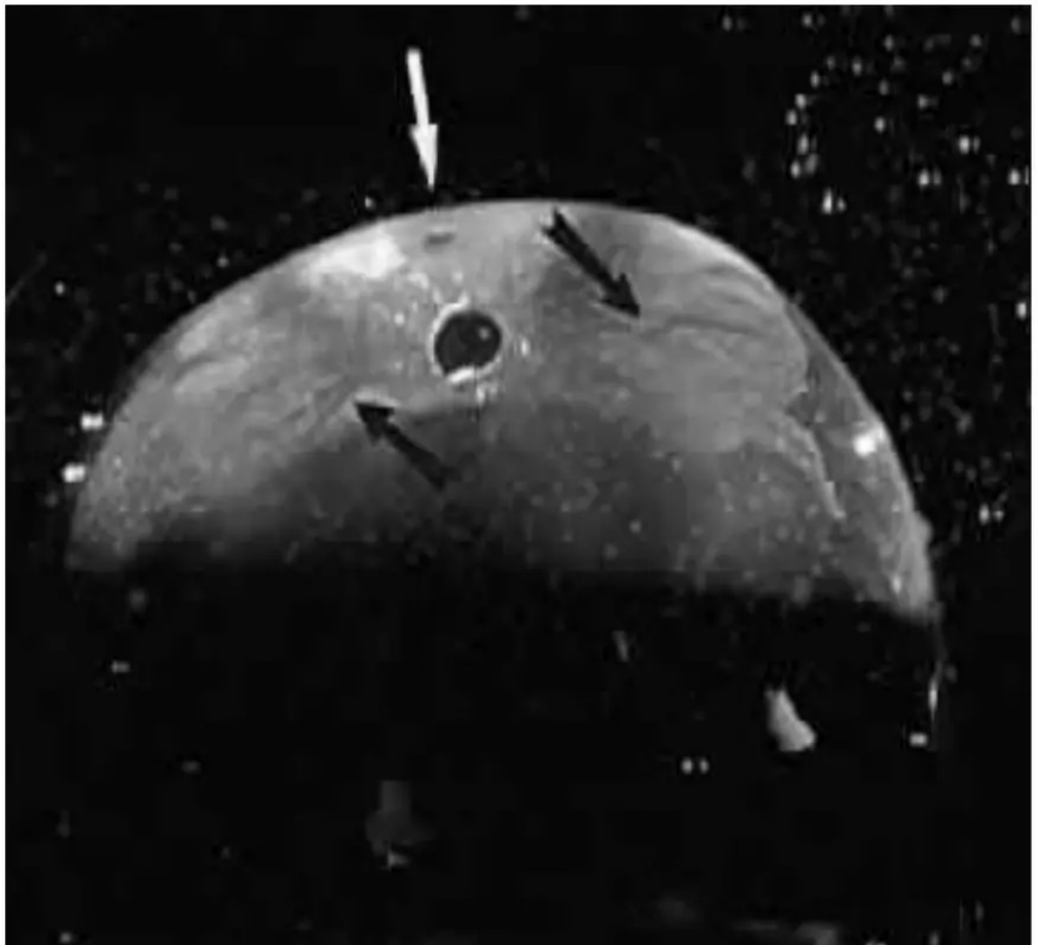
- It **extends medially** to contact lens posterior to lens equator

- The anterior hyaloid membrane anterior bounding surface ,has retrolental indentation
  - **patellar fossa** ,anterior depression of vitreous behind lens

Posterior Vitreous Cortex

Also called Posterior Hyaloid

Posterior from the vitreous base



No vitreous cortex over the optic disc- prepapillary hole

Posterior Vitreous Cortex…..cont'd

- Is **100 to 110 µm thick**
- and consists of densely packed **type II collagen fibrils** and other extracellular matrix components arranged **tangentially** to retina
- It's **thin** over **Macula** due to rarefaction of collagen fibrils
- Boarders with **ILM** of retina w/c is basement membrane of muller cells

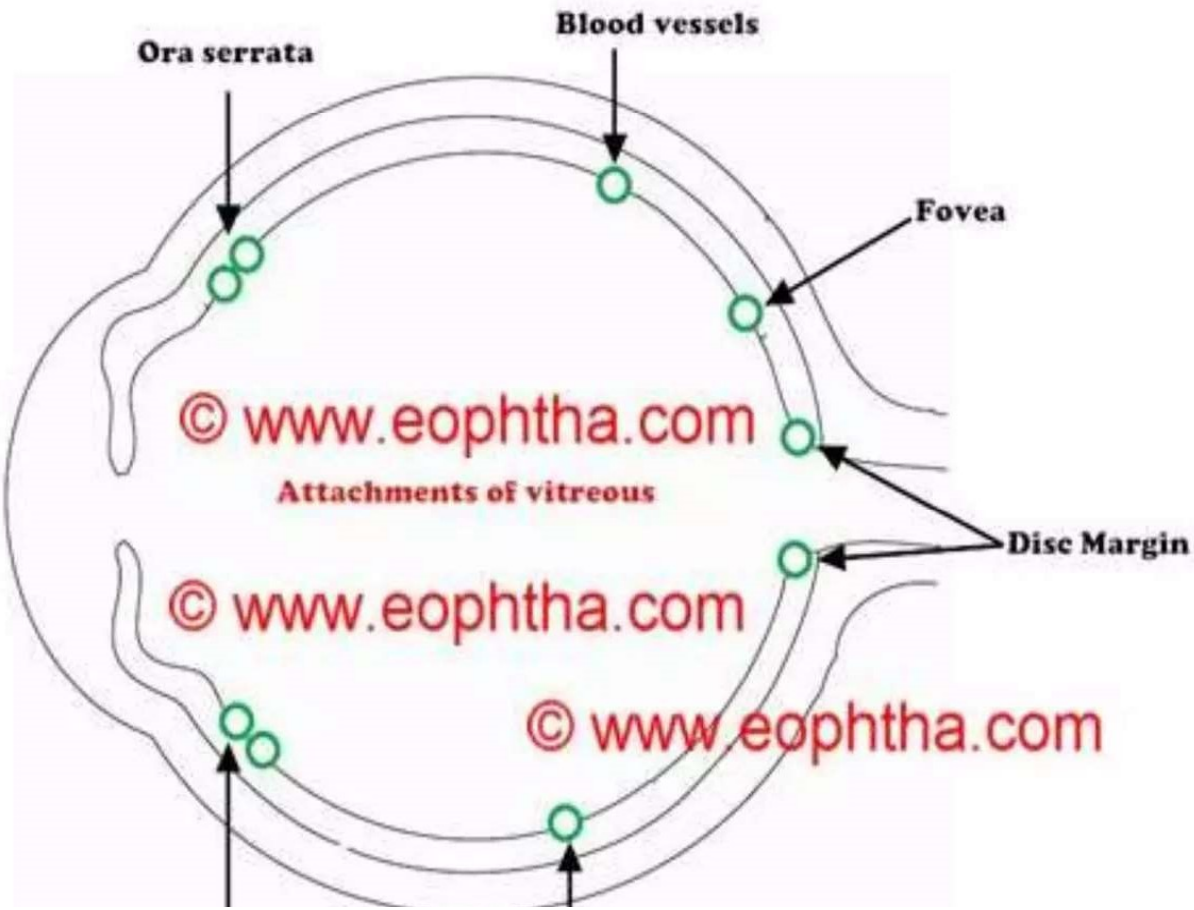
ILM thin over blood vessels ,

- Vitreous strands inserted through pores on ILM
- It extend through ILM to branch and surround vessels
  - **VitreoRetinoVascular Bands**
- These explains **strong adhesion** b/n vitreous and retinal blood vessels
- provide **shock-absorbing** function, damping arterial pulsations during cardiac cycle
- pathologically, It associated with **vitreous traction** on retinal blood vessels –**vit hemorrhage**

Attachments of the vitreous

Firm attachments

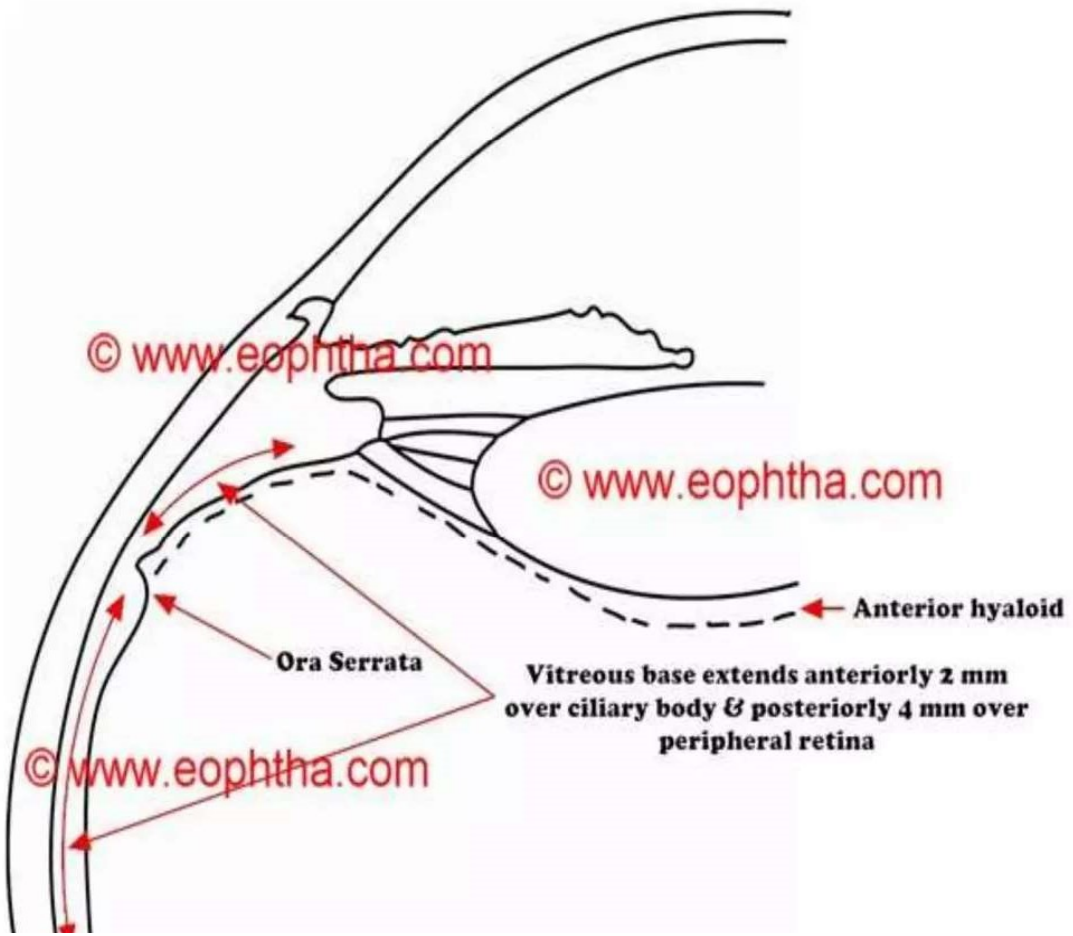
1. Vitreous base- strongest
2. Posterior lens capsule…hyaloidocapsular ligament of wiegner
3. Margins of optic nerve head
4. At macula
5. Around blood vessels variable and weakest



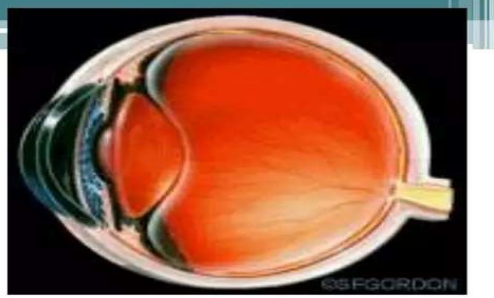
Vitreous Base

- Three-Dimensional zone, centered on **ora serrata**

- Extends from ora serrata
  - Anteriorly 1.5 mm
  - Posteriorly
    - Nasally 3.0 mm
    - Temporally 2.0 mm
- The functional base extends several mm into vitreous body in this region



Lattice degeneration



- An Area with Absence of ILM
- Overlying Area of Liquefied Vitreous
- Condensation & Adherence of Vit Gel
- Inner Retinal Layer Atrophy
- More common superiorly
- Arranged parallel to the ora serrata.
- Incidence- 8% to 10%
- RRD :: Lattice account for 20%
- Symmetric and bilateral,
- Horse shoe Tears &Atrophic holes

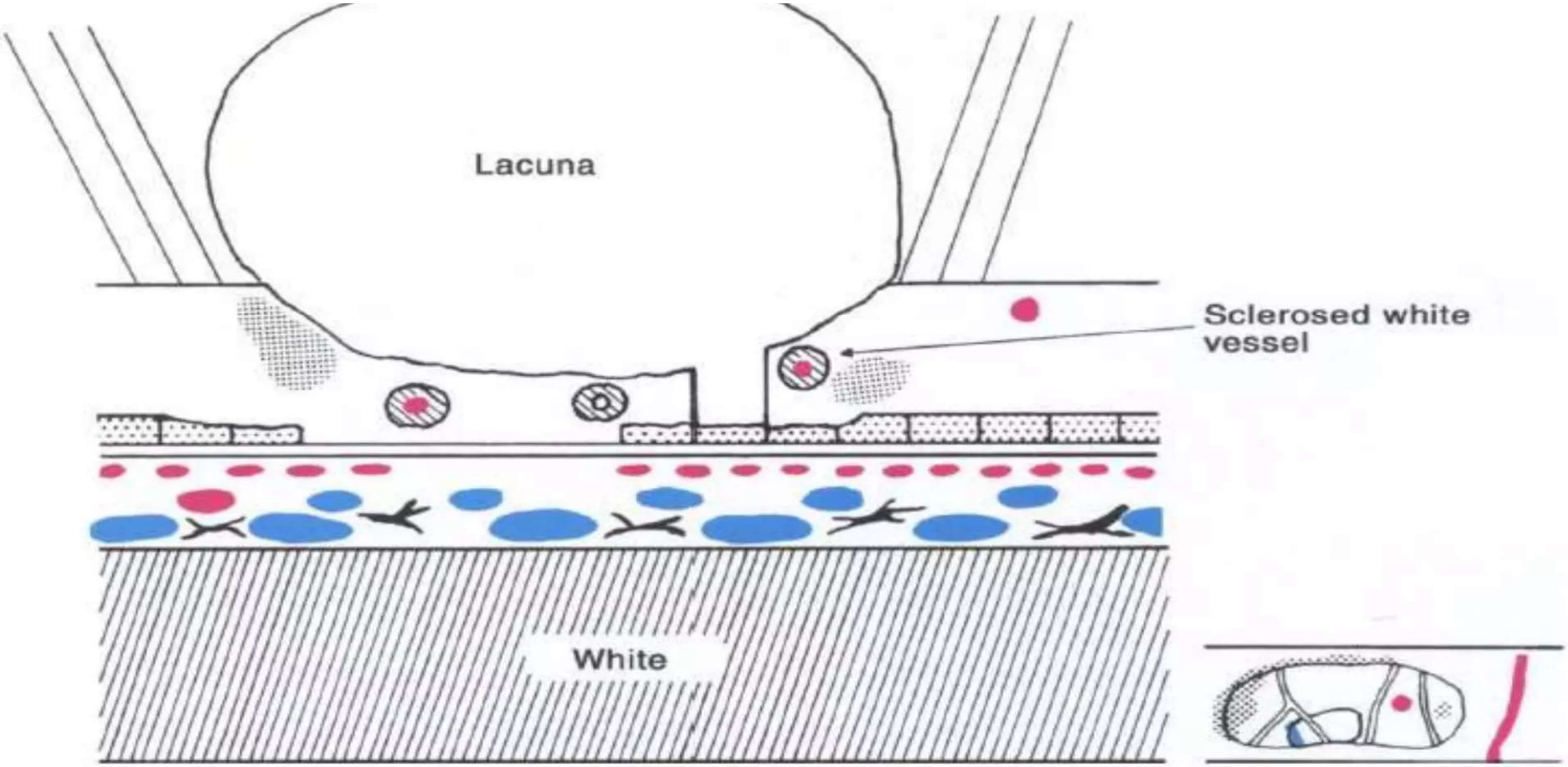
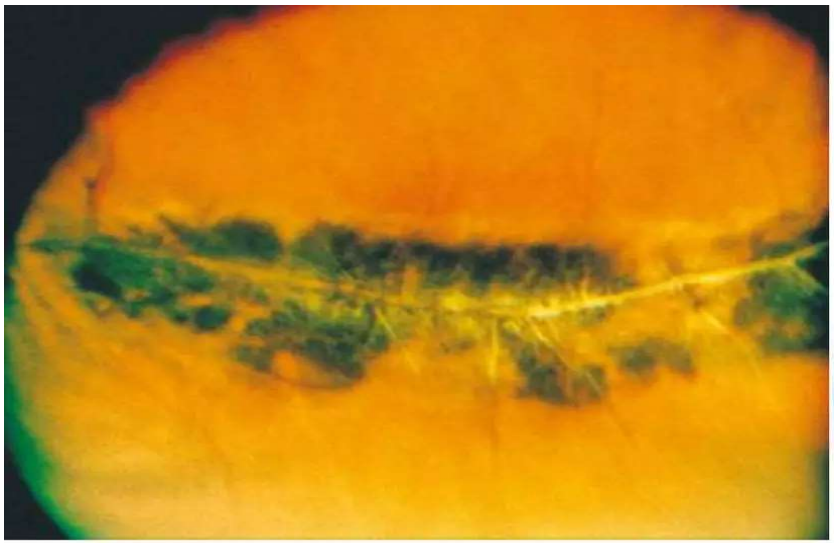
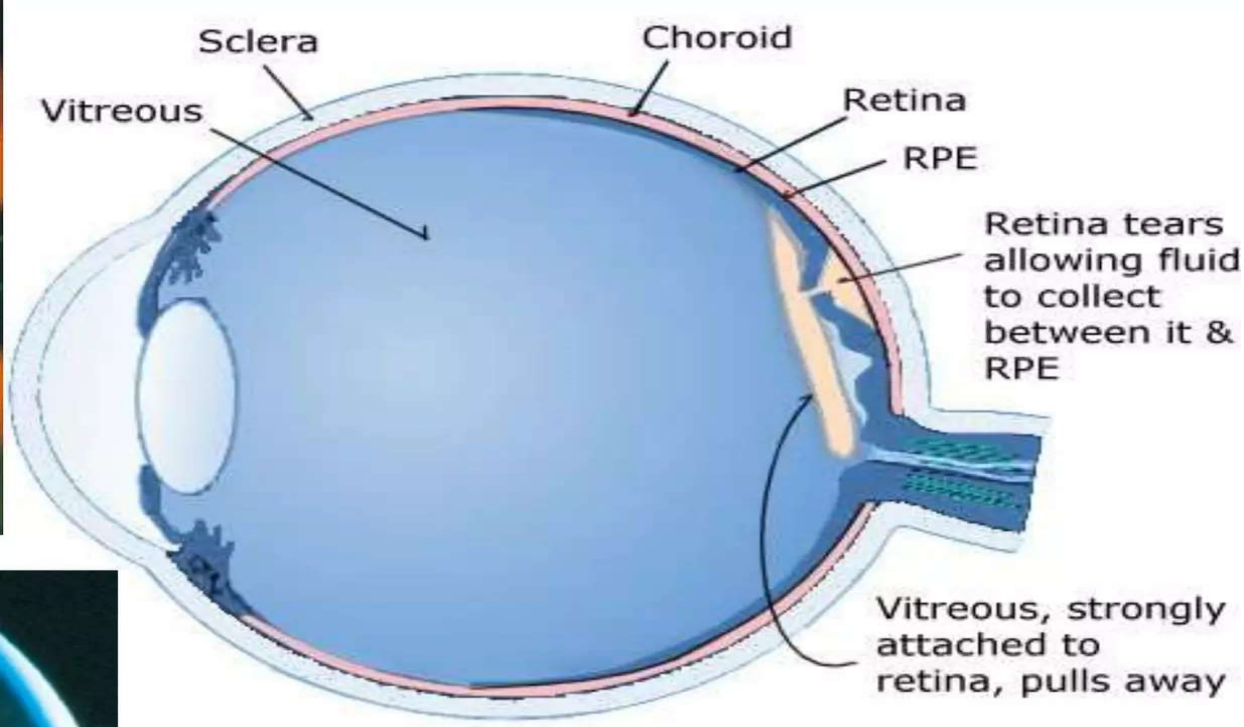


FIGURE 3-98 Lattice degeneration with sclerosed white vessels (center vessel is totally occluded), pigment migration into the sensory retina, a red atrophic hole, chorioretinal atrophy, a vitreous lacuna, and vitreous traction on the edges of the lesion. Note that the retina has degenerated to about one-third its normal thickness.





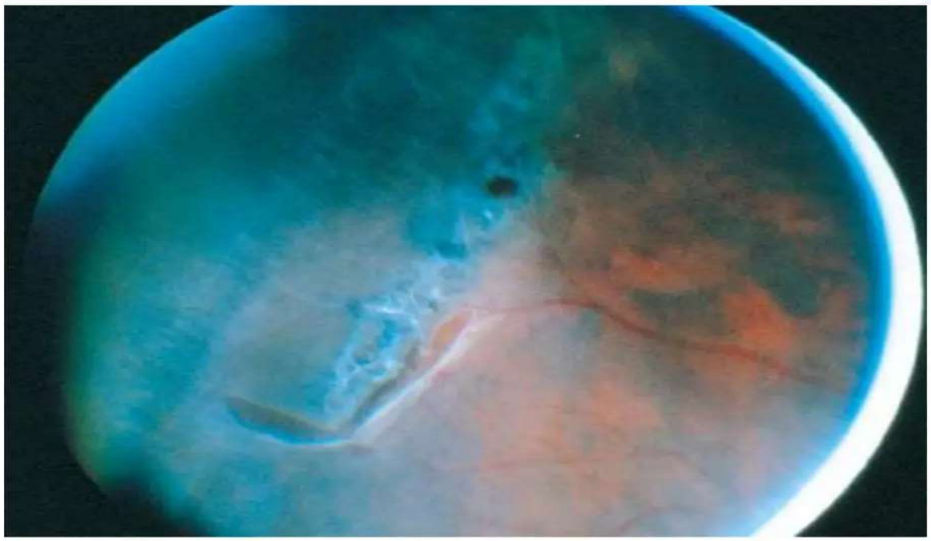


Fig. 6-36-11. Horseshoe tear on the posterior and inferior edge of lattice

Management of Lattice Degeneration

- Lattice without Retinal Breaks - No Rx
- Lattice with Atrophic Holes - No Rx
- Lattice + Holes+ Sub clinical RD – Treat
- Lattice+ Traction Tear - Treat : If Fellow eye has RD,Strong Family History of RD,Aphakic Eyes
- Asymptomatic Traction Tear - No Rx
- Acute Symptomatic Tears - Treat in Phakics & Aphakics

Age related changes in vitreous:

Decrease in gel volume,increase in liquid volume

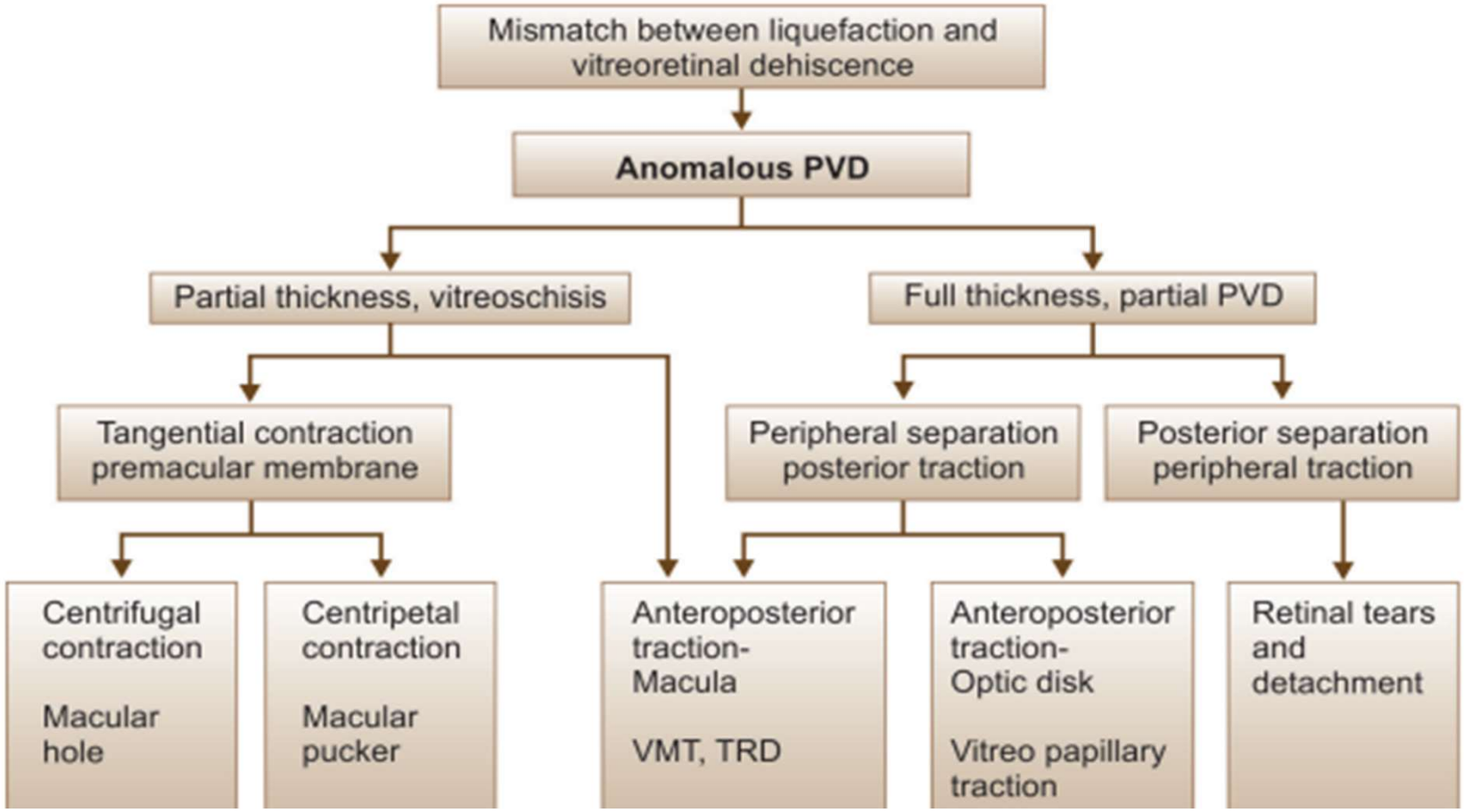
Alteration on hyaluronic acid –collagen, with aggregation of collagen into bundles of firbrils

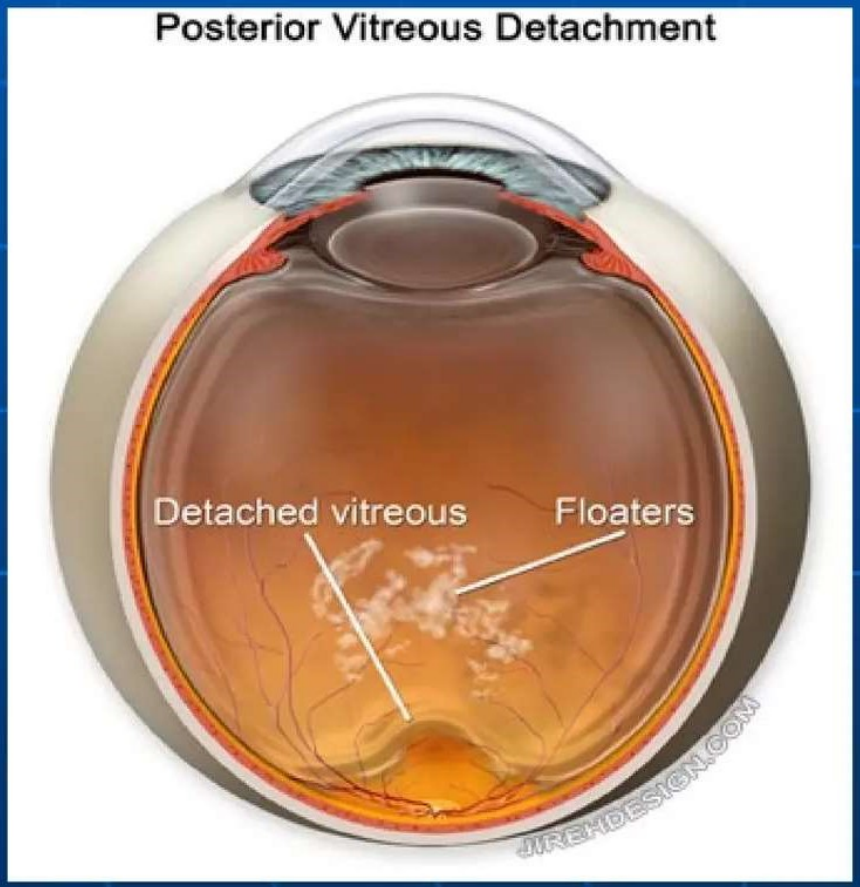
Liquefied laquna in the posterior vitreous

True pvd:
Synchysis: dehiscence at the vitreoretinal interface
Syneresis: liquefaction of vitreous

Occur concurrent?

Vitreoschisis : mimics pvd
Remnant of vitreous cortex attached to retina…….the second membrane


Mismatch between liquefaction and vitreoretinal dehiscence
Anomalous PVD
Partial thickness, vitreoschisis
Full thickness, partial PVD
Tangential contraction premacular membrane
Peripheral separation posterior traction
Posterior separation peripheral traction
Centrifugal contraction
Macular hole
Centripetal contraction
Macular pucker
Anteroposterior traction- Macula
VMT, TRD
Anteroposterior traction- Optic disk
Vitreo papillary traction
Retinal tears and detachment



- The vitreous separates from the surface of the retina
- Floaters can develop
- Is there a tear in the retina?

Posterior Vitreous Detachment Look for A Retinal Tear

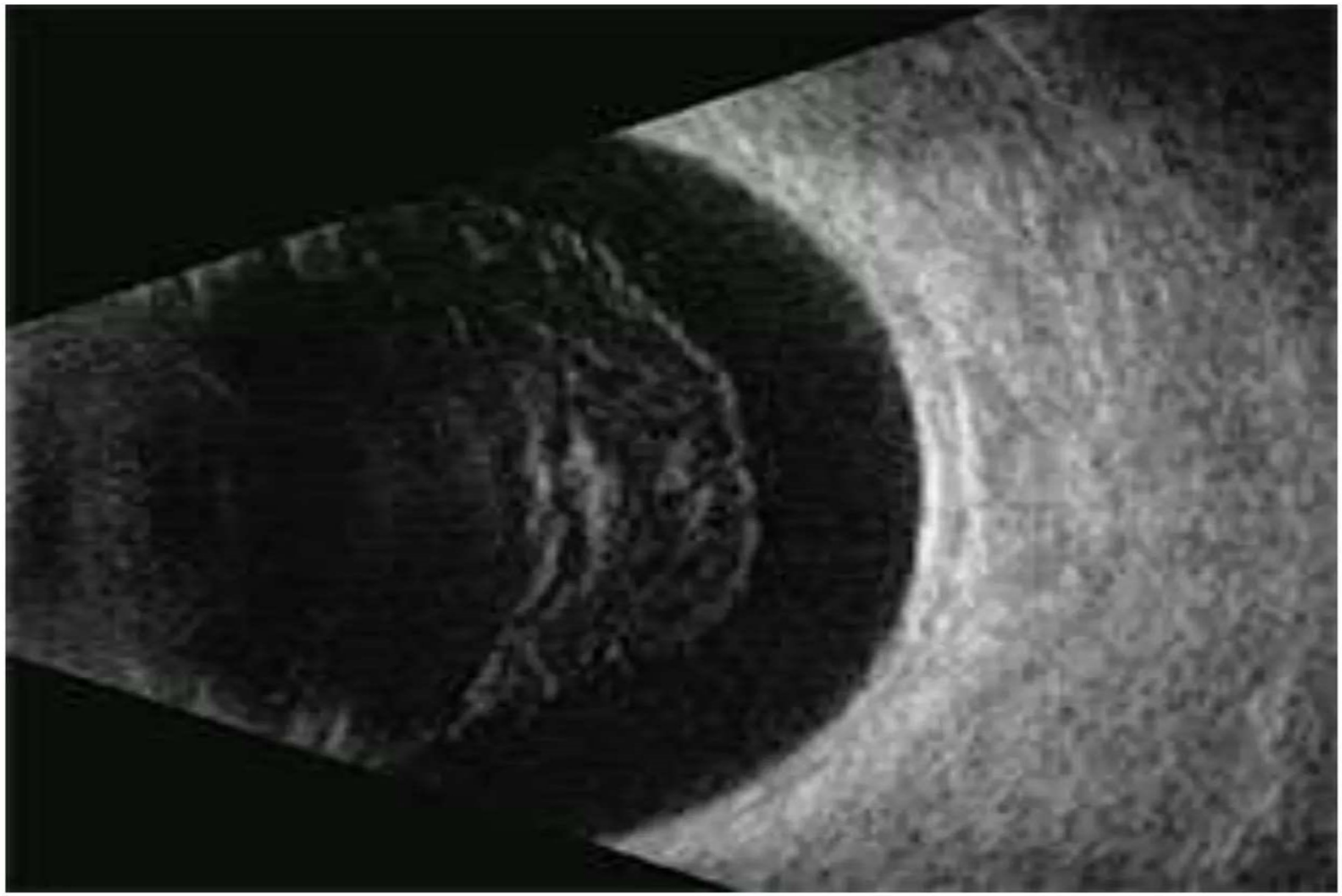
- Examine within 48-72 hours of onset of symptoms of floaters
- The chance of a retinal tear forming is highest within the first 6 weeks of symptoms
- Re-examine 6 weeks after the initial onset of symptoms. Tears may be asymptomatic

CLINICAL FEATURES - SYMPTOMS

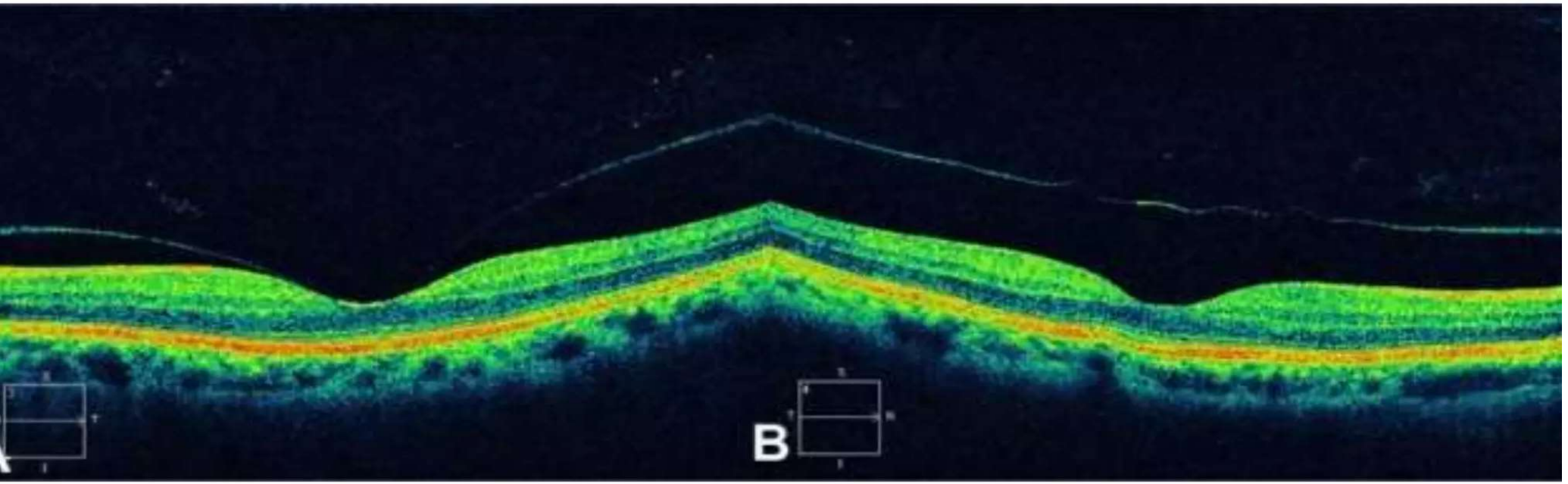
- Flashing lights (photopsia) in PVD is often described as a lightning-like arc induced by eye or head movement, and is more noticeable in dim illumination.
- Floaters (myodesopsia) are mobile vitreous opacities most evident against a bright pale background.
- They are often described as spots, cobwebs or flies (muscae volitantes), and are commonly present in individuals without a PVD, especially myopes.
- A Weiss ring is the detached former attachment to the margin of the optic disc, and may be seen by the patient as a circle or other large solitary lesion; its presence does not necessarily indicate total PVD, nor does its absence confirm the absence of PVD since it may be destroyed during the process of separation.

Pathophysiology

•The vitreous is strongly attached to the retina at the vitreous base, a ring shaped area encircling the ora serrata (2mm anterior and 4mm posterior to it). The vitreous is also adherent to the optic disc margin, macula, main retinal vessels and some retinal lesions such as lattice degeneration.
•The initial event is liquefaction and syneresis of the central vitreous. A rupture develops in the posterior hyaloid (or vitreous cortex) through which liquefied vitreous flows into the retrovitreous space, separating the posterior hyaloid from the retina. It typically starts as a partial PVD in the perifoveal region and is usually asymptomatic until it progresses to the optic disc, when separation of the peripapillary glial tissue from the optic nerve head occurs, usually with formation of a Weiss ring and accompanying symptoms.
•Vitreous traction at sites of firm adhesion may result in a retinal tear with or without subsequent rhegmatogenous retinal detachment.



B-scan ultrasound showing a posterior vitreous detachment



Posterior vitreous detachment. Notes: (A) Partial posterior vitreous detachment is seen on this OCT image. (B) Complete posterior vitreous detachment is visible on the OCT image as a linear reflectivity suspended above the retinal surface

- RD is seperation of neurosensary retina from RPE.
- FOUR types,
  1) Rhegmatogenous RD
  2) Tractional RD
  3) Exudative RD
  4) Combined rhegmatogenous and tractional RD

Rhegmatogenous RD

- Also called primary RD
- Greek,rhegma=break
- Usually due to break in retina in form of hole or tear through which vitreous gains access into subretinal space and seperates sensary retina from pigment epithelium.

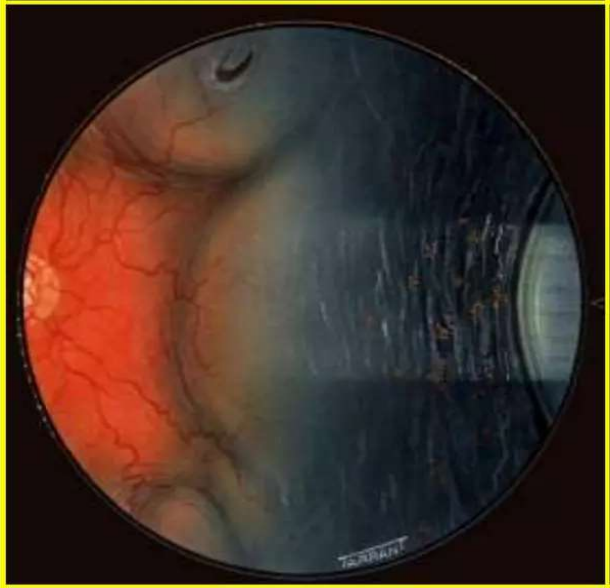
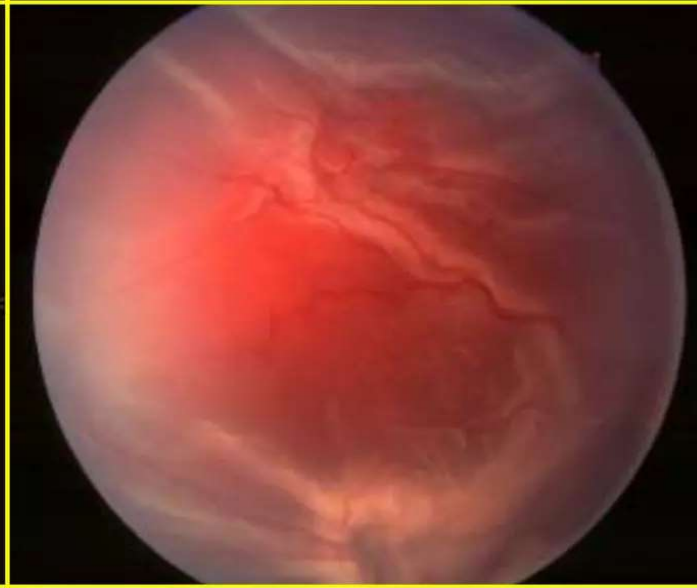
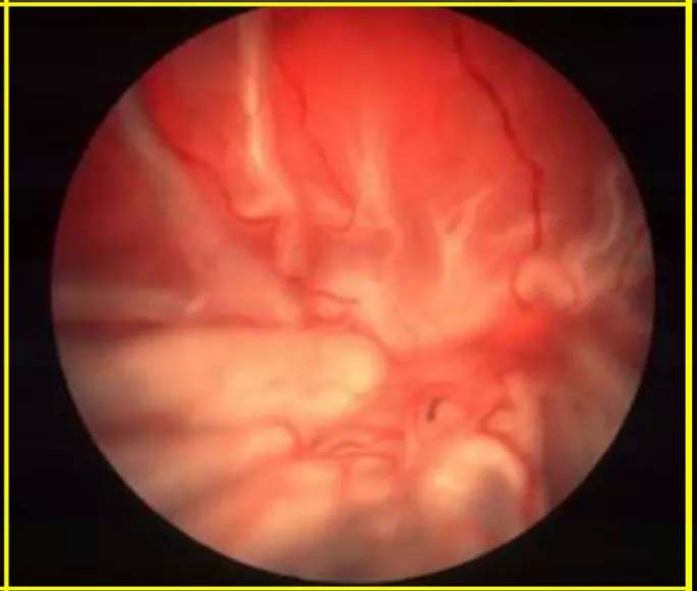
Predisposing(risk) factors

- Age-most common in 40-60yrs of age
- Sex-more common in male(3:2 compared to females)
- Myopia-account for 30% of RD(more common in myope over -3.0D
- Aphakia
- Peripheral retinal degeneration-S-W-A-F-L,
  - S-snail track degeneration
  - White with or without pressure
  - Acquired retinoschisis
  - Focal retinal clumps
  - Lattice degeneration
- Trauma-commonest in young adults
- Cataract surgery-more in ICCE
- Senile posterior vitreous detachment

Classification Of PVR

- The term "proliferative vitreoretinopathy" was coined in 1983 by the Retina Society Terminology Committee.
- In 1989, the classification was amended by the Silicone Study Group before being most recently modified in 1991 to its current classification.
- Currently, PVR is divided into grades A, B, and C.
- Grade A is limited to the presence of vitreous cells or haze.
- Grade B is defined by the presence of rolled or irregular edges of a tear or inner retinal surface wrinkling, denoting subclinical contraction.
- Grade C is recognized by the presence of preretinal or subretinal membranes. Grade C is further delineated as being anterior to the equator (grade Ca) or posterior to the equator (grade Cp) and by the number of clock hours involved (1 to 12).

Proliferative vitreoretinopathy

Grade A (minimal)	Grade B (moderate)	Grade C (severe)
		
• Vitreous haze and tobacco dust	• Retinal wrinkling and stiffness • Rolled edges of tears	• Rigid retinal folds • Vitreous condensations and strands

- **Endophthalmitis**

Inflammatory response to bacterial, fungal , parasitic or viral invasion of the eye.

Causes:

1. Postoperative
2. Bleb associated
3. Post trauma
4. Endogenous
5. Post intravitreal injections

	Post op	Bleb associated	traumatic
s.epidermidis	38%	0	20%
s.aureus	21%	7%	0
Strep spp	11%	57%	13%
bacillus	0	0	27%
Haem. influenza	3%	23%	0
fungi	8%	3%	17%
Mixed flora	2%	0	11%

Metastatic endoph:

- Menningococcus 56%
- Pneumococcus 14%
- Staph. 11%

Chronic Endoph :

- Propionibacterium Acnes
- Staph epidermidis
- Corynebacterium spp
- Fungi

Management:

1. Intravitreal antibiotic
- *Vancomycin 1 mg/0.1 ml*
- *Ceftazidime 1 mg/0.1 ml*
2. Topical antibiotic
3. Systemic antibiotic
4. Steroids
5. iol removal
6. ppv

What location for a retinal detachment would be most amenable to treatment by pneumatic retinopexy?

A. Inferior rhegamatogenous detachment
B. Superior tractional retinal detachment
C. Superior rhegamatogenous detachment
D. Traumautic macular hole

MOST COMMON COMPLICATION POST PPV:

- RPE CHANGES
- CATARACT
- GLAUCOMA
- RETINAL TEAR

MOST COMMON CAUSE OF VIT HAGE

- PVD
- PDR
- RHEG. RD
- RETINAL TEAR

APPROPRIATE MANAGEMENT OPTION FOR PERFORACTING SCLERAL INJURY

- AVOIDANCE OF DILATION
- SCLERAL DEPRESSION
- CT SCAN
- MRI

GIANT RETINAL TEAR DEFINED AS A TEAR EXTENDING FOR AT LEAST HOW MANY CLOCK HOURS:

- 5
- 4
- 2
- 3

MOST COMMON CAUSE OF RD SURGERY FAILURE:

- PVR
- SIZE OF THE BREAK
- EXTENT OF RD
- CATARACT

PVR OCCUR POST PPV IN :

- 50%
- 8%
- 15%
- 70%

EPIRETINAL MEMBRANE OCCUR MOSTLY IN:

- PVD
- VENOUS OCLUSION DISEASE
- TRAUMA
- UVEITIS