

# Flashes, Floaters and Tears! Oh My!

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## Speaker Disclosure:

- ▶ Dr. Wooldridge has received lecture honoraria and/or research support from the following companies:
  - Alcon/Novartis, Allergan, Biotissue, Centervue, Ellex, Oculus, Optovue, Reichert, Synemed

## Is PVD a Sudden or Gradual Event?

- ▶ 1. Sudden
- ▶ 2. Gradual

## Where does a PVD Start?

- ▶ 1. Periphery
- ▶ 2. Optic disc
- ▶ 3. Fovea

## PVD: evolution and complications of its early stages

- ▶ Purpose
  - To summarize emerging concepts regarding the onset and progression, traction effects, and complications of the early stages of PVD
- ▶ Methods: literature review
- ▶ Results
  - OCT shows that PVD begins in perifoveal macula
  - Early PVD stages persist chronically and progress slowly over months to years

Johnson MW AJO 2010 Mar;149(3):371-82.

## Early PVD: Separation from Fovea



## Conclusion

- ▶ Age-related PVD is an insidious, chronic event that begins in the perifoveal macula and evolves over a prolonged period before vitreopapillary separation. Although asymptomatic in most individuals, its early stages may be complicated by a variety of macular and optic disc pathologic features, determined in part by the size and strength of the residual vitreoretinal adhesion.

## Posterior Vitreous Detachment

- ▶ Separation of the cortical vitreous from the internal limiting membrane of sensory retina posterior to the vitreous base<sup>1</sup>
- ▶ Prevalence increases with age, axial length<sup>2</sup>
- ▶ Often occurs earlier in myopes, pseudophakes
- ▶ Vitreous changes gradually with age
- ▶ Often begins sooner than clinically detected
  - Observation techniques
  - Use of OCT to evaluate posterior vitreous

1 Delaney YM *Eye* 2002 Jan;16(1):21-6  
2 Morita H. *Retina* 1995; 15: 117-124.

## Vitreous Syneresis

- ▶ Vitreous gel breaks down
- ▶ Becomes less uniform in consistency and clarity
- ▶ Some parts more watery (liquefaction)
- ▶ Some parts condense into denser strands

## Vitreous Floaters

- ▶ Most commonly caused by PVD<sup>1,2</sup>, vitreous syneresis<sup>2</sup> and asteroid hyalosis<sup>3</sup>
  - Also Vitreous hem, vitritis
- ▶ Often more symptomatic in
  - myopes
    - PVD occurs at earlier age<sup>4</sup>
    - Myopia creates magnification effect
  - Pseudophakes<sup>5</sup>
    - Better contrast sensitivity post phaco
  - Patients doing fine detailed work<sup>5</sup>
  - Personality associated

1 Murakami K, Jalkh AE, et al. *Ophthalmology* 1983; 90: 1271-1276.  
2 Morse PH. *Ann Ophthalmol* 1975; 7: 865-868.  
3 Noda S, et al. *Jap J Ophthalmol* 1993; 37:452-455.  
4 Morita H. *Retina* 1995; 15: 117-124.  
5 Delaney YM *Eye* 2002 Jan;16(1):21-6

## Impact on Quality of life?



## Evaluation of the Patient with Complaints of Flashing Lights or Floaters

## Telephone Triage

- ▶ Flashes or Floaters?
- ▶ Did it start suddenly or gradually?
- ▶ When did it start?
- ▶ Mild, moderate or severe?
- ▶ Any loss of (side) vision?
- ▶ Any associated symptoms?

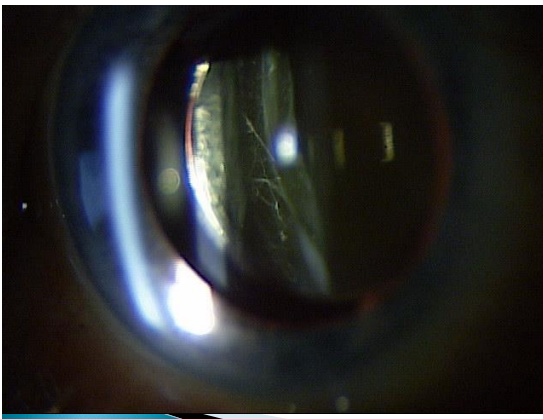
## Seeing Flashes?

- ▶ Careful history
- ▶ Appearance
  - Bilateral or Unilateral
  - Are you sure?
- ▶ Onset/Duration
- ▶ Associated symptoms

## How do you look for a PVD??

## Vitreous Evaluation

- ▶ Slit Lamp WITHOUT the hand held lens!
- ▶ Slit Lamp with HH lens
- ▶ BIO



## Vitreotomy and POAG Floaters – Quality of Life Issues

Vitreous floaters may negatively affect health-related quality of life

(Am J Ophthalmol. 2011;152(1):60–65.)

- Young symptomatic patients were more likely to risk blindness to rid themselves of floaters; patients aged 55 years or younger showed lower standard gamble (blindness) values when compared with patients older than 55 years ( $P = .007$ ).

In many patients, they may significantly interfere with activities of daily living such as reading, driving, or watching TV.

These patients may benefit from intervention.

## Which Treatment Options?

1. Do nothing: try to live with it...
2. Vitrectomy: Total surgical removal of vitreous gel = radical surgical solution with secondary complications (early cataract, retinal detachment, glaucoma)
3. Laser Vitreolysis



## Vitrectomy

High success rate but carries significant risk of complications:

- infection
- retinal detachment
- macular edema
- anterior vitreous detachment
- glaucoma
- cataract

Sendrowski DP, Bronstein MA. Current treatment for vitreous floaters. Optometry. 2010 Mar;81(3):157-61

## Vitrectomy and Cataract

- High incidence of patients develop cataract following vitrectomy
- 2005 study by Holekamp et al, Washington University School of Medicine, measured the oxygen levels adjacent to the lens and near the center of the eye in the vitreous gel of 69 eyes:
  - Before retinal surgery, oxygen concentrations were very low in both places
  - After surgery, oxygen levels in both locations were about eight times higher than normal

•Holekamp NM Shui YB, Beebe DC. Vitrectomy surgery increases oxygen exposure to the lens: a possible mechanism for nuclear cataract formation. American Journal of Ophthalmology, vol. 139, pp. 302-310, Feb. 2005.

## Vitrectomy and POAG

2011 case-control study by Koreen et al estimated the incidence of, and risk factors for, the development of late-onset open-angle glaucoma following vitrectomy in analysis of 285 eyes (274 patients):

- 11.6% of patients developed glaucoma after vitrectomy
- 1.4% in phakic eyes compared with 15% in non-phakic eyes
- Lens extraction is an important risk factor for the development of late-onset open-angle glaucoma after vitrectomy.

Koreen L et al. Retina. 2011 July 14.

## Vitrectomy for Floaters: Risks/Benefits

- Current literature demonstrates vitrectomy has some risk, but is highly effective at improving vision, symptoms, contrast sensitivity, and quality of life
- Small-gauge vitrectomy for floaters is a well tolerated and effective procedure to remove the symptomatic floaters. Symptomatic patients are willing to take some risk to have their troublesome vitreous floaters removed, often resulting in an improvement in their vision and quality of life

Sommerville DN Curr Opin Oph 2015 May;26(3):173–6

## Treatment of Vitreous Floaters with YAG –New Procedure?

- ▶ 15 patients with psychological reactions to floaters treated with YAG
- ▶ Treated both Weiss' rings and central vitreous opacities without PVD
- ▶ Symptoms completely disappeared in all 15
- ▶ Anxiety issues completely cleared
- ▶ No complications reported
- ▶ Conclusion: Safe and effective therapy

Tsai W et al BJO 1993;77:485-488

## Conventional YAG Laser for Floaters

- ▶ 1992-2000; Single clinic in UK
- ▶ 39 of 42 eyes received YAG vitreolysis
  - 71% eyes were myopic
  - 31 phakic, 11 pseudophakic
  - Ave. 1.62 sessions
- 7.7% subjectively worse
- 53.8% same
- 35.8% moderate benefit (30-50% improvement)
- 2.5% significant benefit
  - (50-70% improvement).
- ▶ No cases were 100% successful in eliminating symptoms.

Delaney YM Eye 2002 Jan;16(1):21-6

## Conventional YAG Laser for Floaters

- ▶ 15 of 42 eyes benefitted
- ▶ 14 of those 15 felt no PPV necessary
- ▶ No complications after ave. FU of 27 mos.
- ▶ Conclusions:
  - Generally safe but only moderately effective
- ▶ 15 eyes underwent PPV
  - 93% had full resolution of symptoms
  - One patient developed retinal detachment

## Conventional YAG Treatment (cont.)

- ▶ 15 eyes underwent PPV
- ▶ Ave. of 32 months FU
  - 93% had full resolution of symptoms
  - One patient developed retinal detachment
  - One patient developed cataract
    - One patient had combined phaco/IOL/PPV
    - Unclear how many patients were initially phakic

## History of Yag Laser for Floaters

- ▶ Several reports in literature<sup>1,2,3</sup>
- ▶ Variable success rates
- ▶ Procedure generally felt to be poorly successful using conventional YAG laser
- ▶ Performed very infrequently

1 Tsai WF, Chen YC et al *Br J Ophthalmol* 1993; 77:485-488.  
 2 Toczolowski J, Katski W. *Klinika Oczna* 1998; 100:155-157.  
 3 Delaney YM Eye 2002 Jan;16(1):21-6

## Technical Considerations

Conventional YAG lasers are designed for posterior capsulotomy and iridotomy treatments:

- Limited view of the vitreous, which can make it difficult to identify the floaters and membranes to target
- Risk of damage to surrounding ocular tissue in inexperienced hands

Ellex has designed the first new-generation YAG laser specifically suited to perform vitreolysis as well as more standard procedures



## Vitreolysis: the Benefits

Low complication rate = 0.1 % (rising IOP, choroidal micro hemorrhage, cataract...)

- No significant retinal damage reported in more than 15,000 cases worldwide (Karickhoff)

Effective for 70–95% of floater types

- Best results on hyaline floaters/opacities and membranotomies

High success rates with reduction of symptoms:

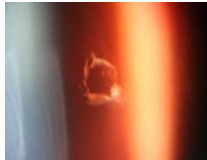
- 85% success rate on 112 eyes treated (Geller, S: Nd YAG laser treatment effective for floaters. OSN, Dec. 1, pg. 37, 2001)
- 92% success rate on 200 eyes treated (Karickhoff J., Formal Floater Study under the supervision of the INOVA Fairfax Hospital Institutional Review Board)

## What Kind of Floaters are Good for Treatment?

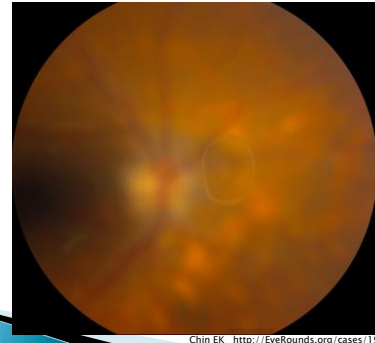


## Two Types of Treatable Floaters

- ▶ PVD: Weiss Ring located on the posterior vitreous face, soft, and can usually be completely vaporized by the laser
- ▶ Floaters located within the vitreous as a result of vitreous degeneration; these syneresis floaters are dense, fibrous and more difficult to vaporize completely. The goal is to move them out of the visual axis and thin them out

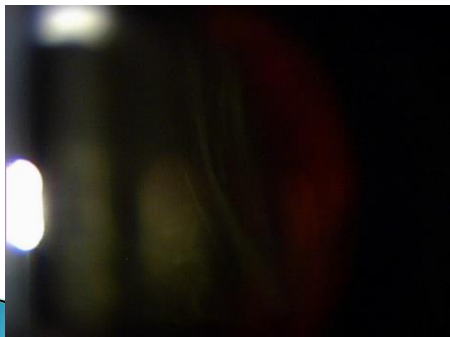


## Weiss Ring Good.....



Chin EK <http://EyeRounds.org/cases/196-PVD.htm>

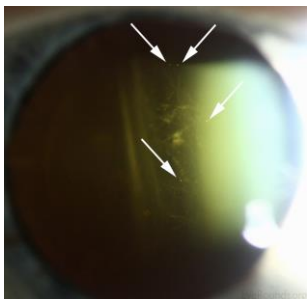
Good Choice Joyce



Good Choice Joyce

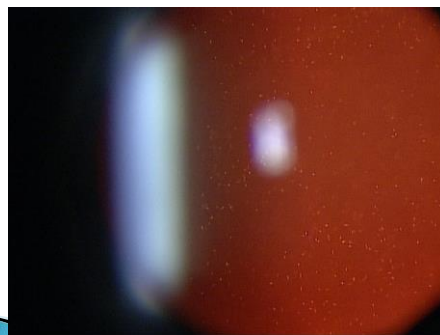


Wispy Floaters/ Syneresis...Bad



Gauger E, Chin EK, Sohn EH. Vitreous Syneresis: An Impending Posterior Vitreous Detachment (PVD). Oct 16, 2014; Available from: [EyeRounds.org/cases/196-PVD.htm](http://EyeRounds.org/cases/196-PVD.htm)

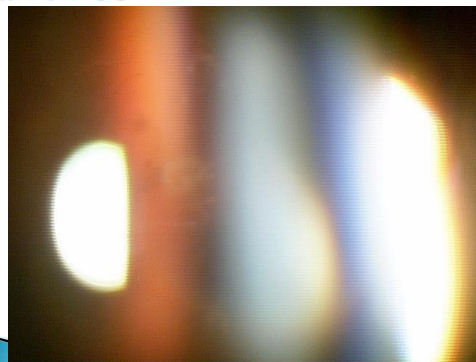
Vitritis...BAD



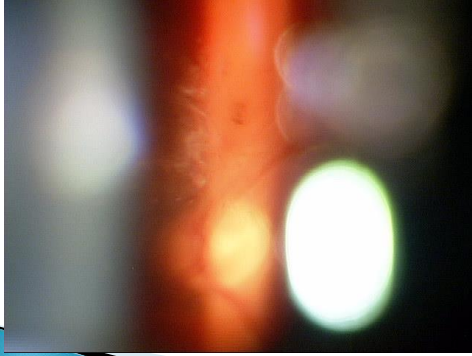
Darren OS



Darren OS



## Darren OD



## Vitreolysis Treatment

## Vitreolysis of Weiss Ring



## Clinical Exam Consultation Considerations

- Size – may require more energy and treatments
- Density – may require more energy and multiple treatments
- Location – Phakic patient
- Number – may need multiple treatments
- Visualization – can I see them to treat them  
*even do the laser*

## Pre-Treatment: Vitreolysis

1. Full dilated eye examination with attention to retina and periphery. Aggressive dilation with both tropicamide and phenylephrine
2. Personal discussion with the patient establishing appropriate expectations and discussion of the risks of the procedure.
3. Allow sufficient time for the procedure – from 20 minutes

## Potential Complications

- ▶ Accidental retina hit or shock-wave contusion of retina or sub-retinal tissues.
  - Avoid treating over the macula in the posterior 1/3 of the vitreous.
- ▶ Retinal detachment
  - While this is worth mentioning in the consent form, RD related to YAG vitreolysis has not been reported in 20 years of experience.
- ▶ Traumatic cataract
  - May have rapid-onset of symptoms if there is a breach of the posterior capsule
- ▶ Increased IOP4
  - Rare, usually transient but may be longer term?
- ▶ Uveitis.

4.Cowan LA et al AJO 2015 Jan;159(1):138-43



## Symptomatic PVD and the incidence of delayed retinal breaks: Meta-analysis

- ▶ Purpose
  - To establish the necessity for an early follow-up examination after an initial examination with negative results for patients with acute, symptomatic PVD
- ▶ Results
  - Case series:
    - Incidence of retinal tears in eyes with a symptomatic PVD 8.2%
  - Meta-analysis
    - Overall rate of retinal break: 21.7%
    - In total, 1.8% of patients had tears that were not seen on initial examination.
    - Of the 29 patients with delayed-onset breaks, 24 (82.8%) had at least one of the following:
      - vitreous hemorrhage at initial examination, hemorrhage in the peripheral retina at initial examination, or new symptoms.

Coffee RE AJO 2007 Sep;144(3):409-413.

## Conclusions

- ▶ If the results of an initial examination of a patient with an acute, symptomatic PVD are negative for retinal tears, the necessity of early follow-up may be best determined by the presence of pigmented cells in the vitreous, vitreous hemorrhage, or retinal hemorrhage.
- ▶ Most patients with symptomatic PVD may not need an early follow-up examination.



## Rob's Meta-analysis of the Meta-analyses

- ▶ See them again anyway!
- ▶ Tell them to call STAT with onset of NEW or ADDITIONAL floaters
- ▶ RTC 4-6 weeks
  - EVEN IF YOU HAVE NO NEW FLOATERS

## Prophylactic treatment of retinal breaks--a systematic review

- ▶ Literature review looking at
  - Need for follow-up of PVD
  - Prophylactic treatment of
    - Asymptomatic breaks
    - Symptomatic breaks
- ▶ Initial exam after symptomatic PVD identified 85-95% of subsequent retinal breaks
  - Later breaks only found on FU exams were in cases of vitreous hem preventing clear view at onset

Blindbaek S et al Acta Ophthal 2015 Feb;93(1):3-8

## Prophylactic treatment of retinal breaks

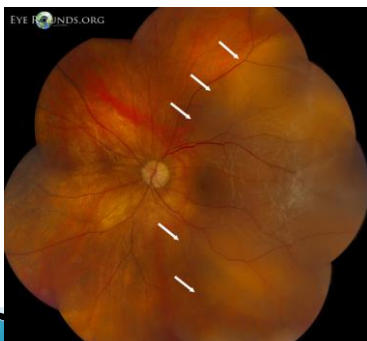
- ▶ Asympt. and symptomatic retinal breaks progressed to RD in 0-13.8% and 35-47% of cases, respectively
- ▶ Cumulated incidence of RD despite prophylactic treatment was 2.1-8.8%
- ▶ Review suggests that FU after symptomatic PVD is only necessary in cases of incomplete retinal examination at presentation.
- ▶ Prophylactic treatment of symptomatic breaks must be considered
- ▶ No unequivocal conclusion could be reached with regard to prophylactic treatment of asymptomatic retinal breaks

Which Types of Tears/Detachments are Urgent?

HST with Macula On R.D.



Macula Off R.D.



Macula Off? On??

