



Yag Laser Vitreolysis Role of Anterior Segment

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No Financial Interest

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Vitreous opacities: a common problem?

Collagen fibers in the vitreous may form bundles which can pass across the visual axis as floaters .



over 45 years the hyaloid may separate from the retina and float across the visual pathway (vitreous membrane)

IDEA:

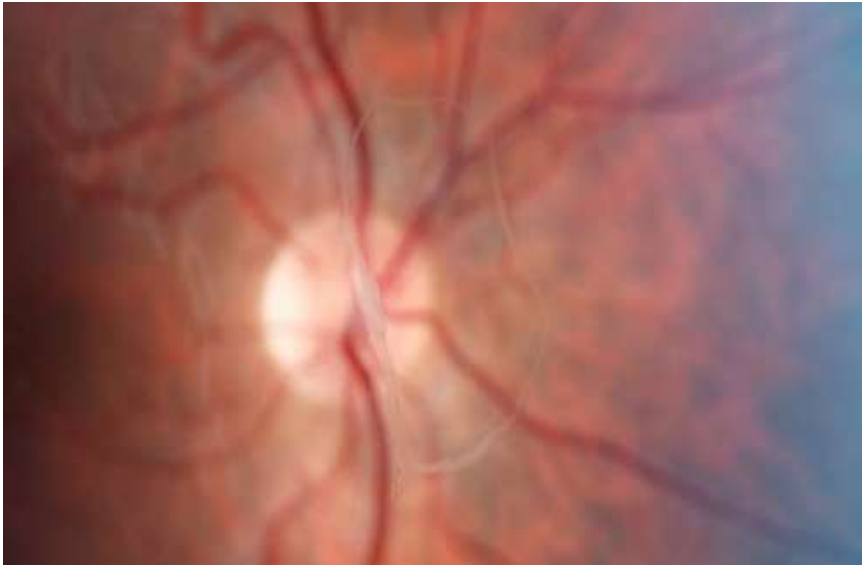
Why to treat Vitreous floaters ?:

- 1- A common Problem.*
- 2- Patients are suffering during their work driving, and reading ,..*
- 3 - Easy technique for treatment.*

Types of Floaters

Floaters pulled off the Internal Limiting Membrane by PVD

Quoted from Dr. Amr Bessa



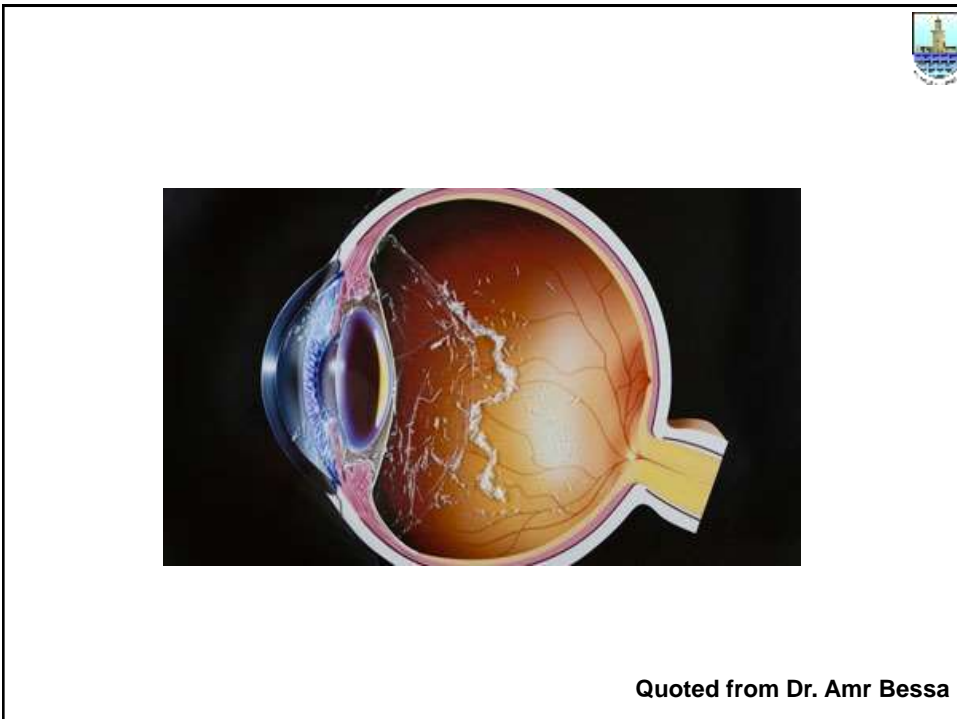
Quoted from Dr. Amr Bessa

Types of Floaters



Floaters due to vitreous shrinkage

Quoted from Dr. Amr Bessa

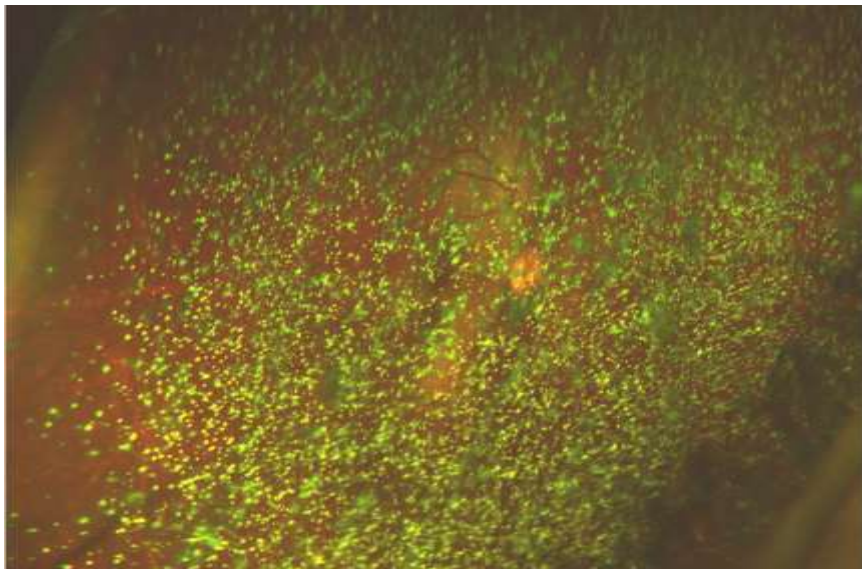




Types of Floaters

Floaters due to vitreous degeneration

Quoted from Dr. Amr Bessa

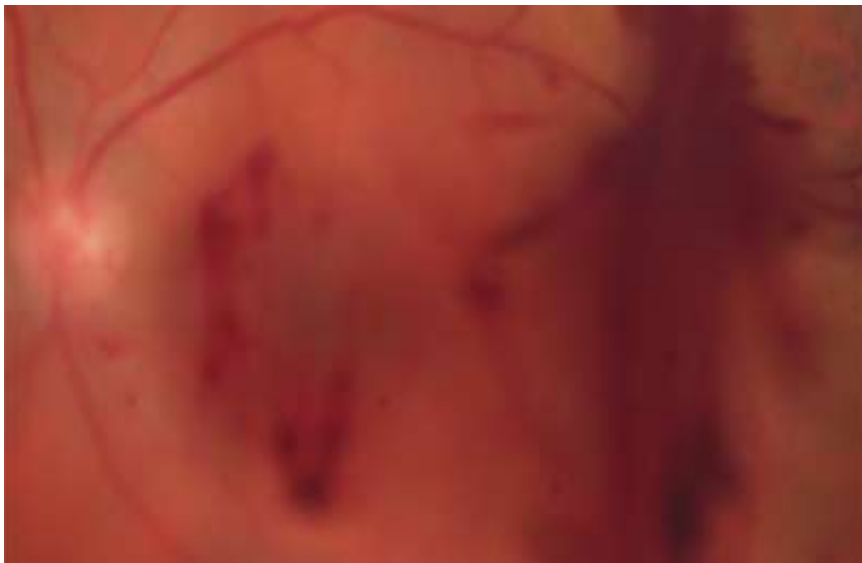


Quoted from Dr. Amr Bessa



Vitreous Haemorrhage

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Treatable Floaters

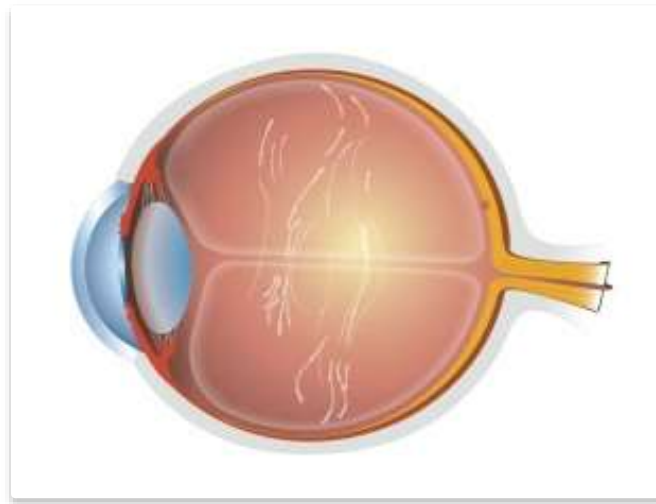
Quoted from Dr. Amr Bessa



Young Myopes



Quoted from Dr. Amr Bessa

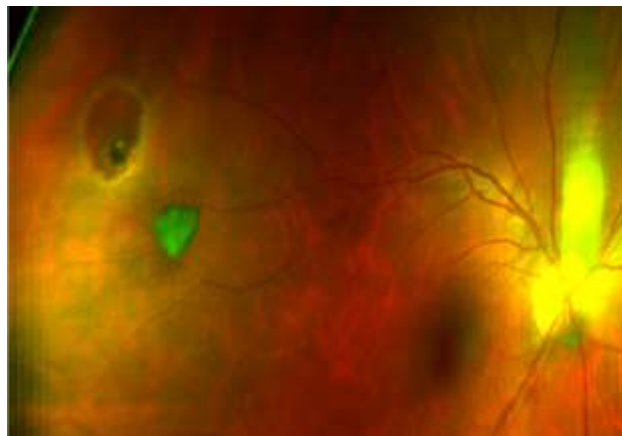


Cob webs

Quoted from Dr. Amr Bessa



Operculum



Quoted from Dr. Amr Bessa

Patient Selection



- **Differentiate symptoms**
 - Floaters*; discrete dark masses (treatable).

 - Vitreous Face* haze, (untreatable)

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Symptoms Severity



- Size.

- Anterior-posterior location.

- Central-peripheral location.

- Personality of the patient.

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Floater Examination



- Complete ophthalmic examination.
- Vitreous examination on dilated pupil for PVD.
- Peripheral retina examination.
- Ask the patient to draw the floaters

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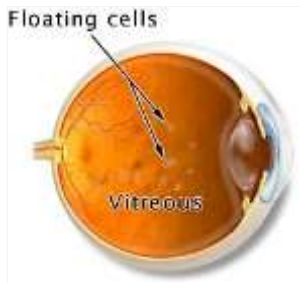
Patient Counseling



- Expectations.
- Percentage of improvement.
- Preparation.

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Symptoms of Vitreous Degeneration



➤ **Vitreous floaters in the anterior vitreous could be ignored.**

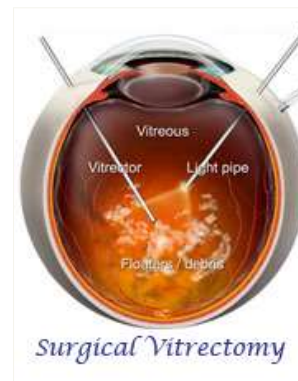
➤ **But in the Mid and Posterior vitreous are visually significant**

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Which treatment options?

1. Do nothing: try to live with it...
2. Total surgical removal of vitreous gel = radical surgical solution with secondary complications (early cataract, retinal tears & Detachment).

3. YAG Laser Vitreolysis



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Solution:



- 1- Advancement of **technology in YAG laser** machines.
- 2- Advancement of examination and treatment **contact lenses**.
- 3- Short **learning curve**.
- 4- Advancement of **wave length control**.

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Requirements:



- **The machine**
- **The contact Lenses**

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Yag laser machine problem

- The regular YAG laser can perform this procedure only if the floater is in the anterior vitreous ,
But could never reach the mid vitreous or posterior vitreous.
- **The Laser should have the slit lamp illumination almost coaxial with the treatment beam**

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The Machine

Nd:YAG laser optimized for use in the posterior segment, in addition to its use in the anterior segment. For the user to be able to visualize and treat the vitreous strand/opacity:

1-The illuminating light source must be positioned on the same vertical optical axis as the oculars and laser energy beam.


2- The quality of the laser cutting (profile of the treatment beam).

3-Speed of laser is also essential.


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Ultra Q™ Reflex System Description




Key system components



Reflex Illumination Mirror

Anterior & Posterior Offset
continuously adjustable from -
500 to +500 microns



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What is Reflex Technology?



Slit lamp illumination tower design:

- converges the surgeon's vision and the slit lamp illumination onto **the same optical path,**
- and **focuses** them to the same optical plane as the treatment beam.



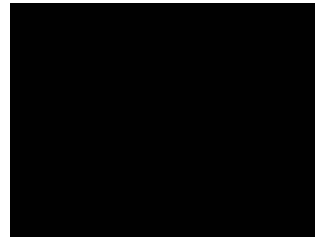
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What is Reflex Technology?



Reflex illumination mirror ensures that the laser beam is never obstructed so all energy delivered to target site:

- illumination tower can be used coaxially, in addition to the typical off-axis position
- only new-generation YAG laser on the market specifically designed for the treatment of vitreous floaters



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Choosing the right lens



The image displays three different types of vitreous lenses used in ophthalmology. Each lens is shown in a separate box with a corresponding label and application note. The Karickhoff 21mm lens is for posterior vitreous opacities. The Payman 18mm Wide Field lens is for anterior vitreous opacities. The Karickhoff 25mm Off-Axis lens is for off-axis vitreous opacities.

- Ocular Karickhoff 21mm Vitreous Lens** (For posterior vitreous opacities)
- Ocular Payman 18mm Wide Field Vitreous Lens** (For anterior vitreous opacities)
- Ocular Karickhoff 25mm Off-Axis Vitreous Lens** (For off axis vitreous opacities)

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Principles of photodisruption

- Very short **pulse width (nanoseconds)**
- Very Small **spot size (8 microns)**.
- Produce **optical breakdown (explosion)** at very low energies **(0.8 millijoules)**.
- Obtained using a few millijoules
- Small explosion + shock-wave ruptures tissue

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Patient Selection



• Patients reporting **persistent moving shadows** in their vision due to vitreal condensations, fibers, strands, and clouds:

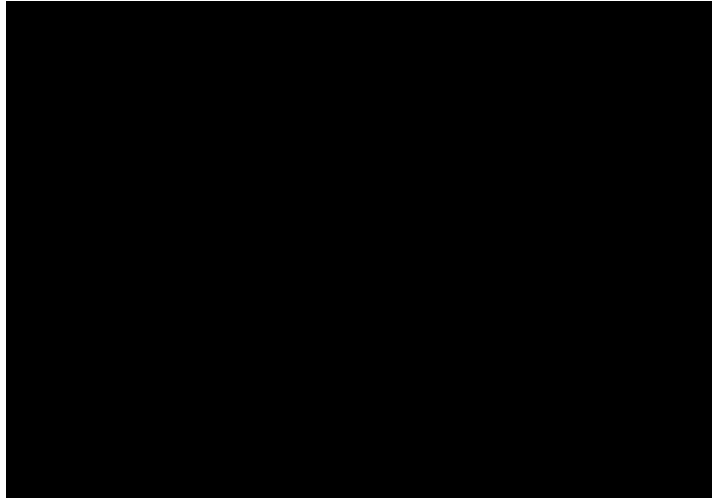
- Not associated with active retinal pathology
- Not associated with active inflammation
- Not associated with excessive lenticular astigmatism
- Present for 2-3 months and stable in behavior
- Absence of peripheral flashes of light suggesting an incomplete posterior vitreous detachment

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YAG Vitreolysis in the Practice

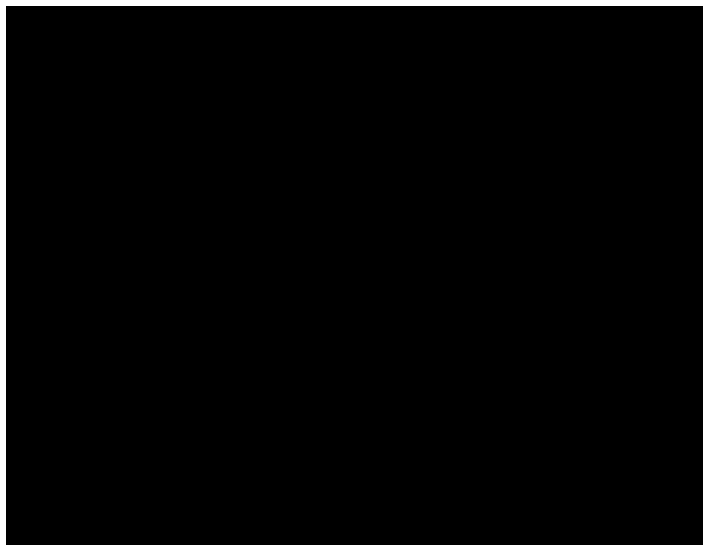
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Technique 1: Aiming at the strands in presence of suspended floaters



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Technique 2: Vaporizing the floater





Various Methods

- Vaporise individual floaters.
- Lyse membranes.
- T-membranotomy (C. Van der Windt).
- Aim to decrease symptoms but not remove completely.

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The importance of optical breakdown

- If treatment is performed **under the level of optical breakdown**, floaters are **fragmented** rather than vaporized and only moderate improvement is observed (see study by Delaney et al* at 1.2mJ)

*Delaney Y et al: Nd:YAG vitreolysis and pars plana vitrectomy: surgical treatment for vitreous floaters. Eye 16:212-26, 2002

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The importance of optical breakdown

- **At the level of optical breakdown** the tissue effects are **ionization**, mechanical effects, disruption and disintegration. There are no heat effects such as collagen shrinkage or burning surrounding the center of explosion.
- At **this level** there is **disruption**, floaters are primarily **vaporized – converted to gas bubbles** that are gone the next morning

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Selection of First Patients:

- 1- Pseudophakics. (to avoid lenticular photo disruption)
- 2- Mid vitreous opacities. (Easy accessibility)
3. Avoid near retinal floaters.
- 4- Avoid near macular floaters.
- 5- Explain 70% success of procedure.
6. Start with large floaters and Weiss ring , mid-vitreous

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But so rewarding



- Very low complication rate .
- Very few cases IOP rise, limit n° of shots to 500 for safety
- Best results on hyaline floaters and membranotomies.
- Very high success rates with reduction of symptoms:
 - 85% success rate on 112 eyes treated
 - 92% success rate on 200 eyes treated

Geller, S: Nd YAG laser treatment effective for floaters. OSN, Dec. 1, pg. 37, 2001

Karickhoff J., Formal Floater Study under the supervision of the INOVA Fairfax Hospital Institutional Review Board

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To summarize :



Factors for consideration when choosing a YAG laser for Vitreolysis:

- ✓ ***Laser must be powerful enough to create **optical breakdown** so floaters are **disrupted** without spread of shock wave to surrounding tissues.***
- ✓ ***Aiming system must be **precise** to ensure accurate placement of optical breakdown plasma at every shot.***
- ✓ ***Anterior and posterior **offset** combined with 2 point aiming for **pinpoint** precision***

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Thank you

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