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
Types of Floaters

*Floaters due to vitreous shrinkage*

Quoted from Dr. Amr Bessa
Quoted from Dr. Amr Bessa
Types of Floaters

Floaters due to vitreous degeneration

Quoted from Dr. Amr Bessa
Vitreous Haemorrhage

Quoted from Dr. Amr Bessa
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)

Symptoms Severity

• **Size.**

• **Anterior-posterior location.**

• **Central-peripheral location.**

• **Personality of the patient.**
Floater Examination

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

Patient Counseling

- Expectations.
- Percentage of improvement.
- Preparation.
Symptoms of Vitreous Degeneration

- Vitreous floaters in the anterior vitreous could be ignored.
- But in the Mid and Posterior vitreous are visually significant

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
Solution:

1- Advancement of technology in YAG laser machines.

2- Advancement of examination and treatment contact lenses.

3- Short learning curve.

4- Advancement of wavelength control.

Requirements:

• The machine

• The contact Lenses
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

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.
Ultra Q™ Reflex System Description

Key system components

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

No financial interest

El-Massry
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.

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
Choosing the right lens

- **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

**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
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

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.

The importance of optical breakdown

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

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
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
    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

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.
Thank you

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