


NEW ORLEANS ACADEMY OF OPHTHALMOLOGY

Retina's Believe It or Not! My Most Shocking Retina Cases



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Patient

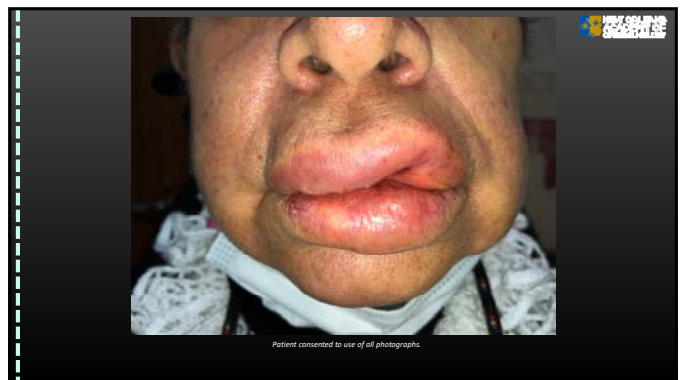
- 67 y/o healthy F with acute-onset vision loss OD x 2 days following self-injection of 5cc petroleum jelly into upper lip
- Immediate eye pain, then vision loss OD when woke up next day
- Injected lower lip 2 yrs ago without issue

- Va OD 20/40, OS 20/30+2
- No APD
- Confrontation VF full

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Disclosures

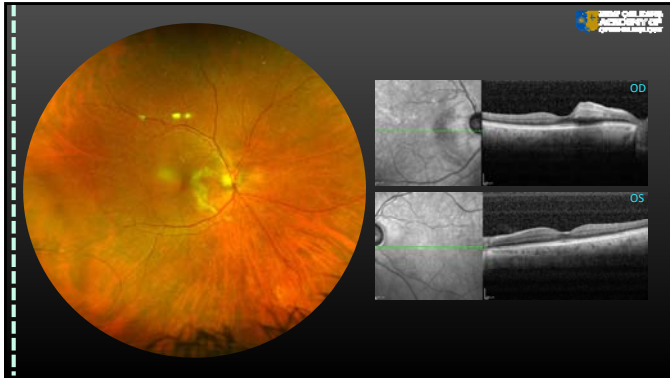
- Alcon, Allergan/AbbVie, Alimera Sciences, REGENXBIO, Novartis, Regeneron, DORC, Genentech, Opthea (consultant)
- DRRCR Retina Network, Alimera Sciences, AGTC (research)
- Springer Publishers (royalties)



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Case #1

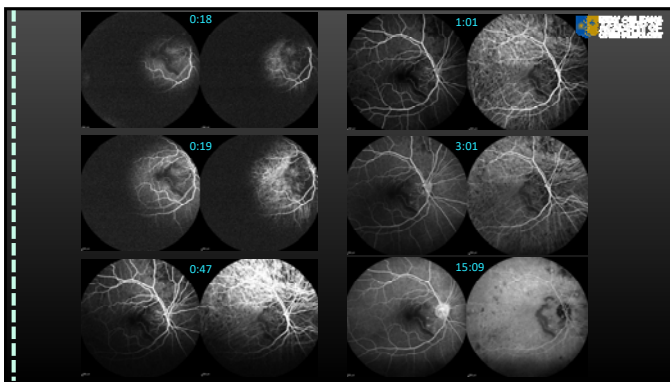




DIY cosmeceuticals on the rise

- 3.4M Americans received dermal fillers in 2020¹
- Filler-related ocular complications are rare when done professionally, but be aware that cosmetic self-injection is happening^{2,3}

¹American Society of Plastic Surgeons. <https://www.plasticsurgery.org/Documents/News/Statistics/2020-plastic-surgery-statistics-report-2020.pdf>.
²<https://www.youtube.com/watch?v=4ZfWd0...>. Does not represent endorsement.
³<https://www.youtube.com/watch?v=612C201178...>. Does not represent endorsement.
https://www.tiktok.com/@browniebyemmy/video/7000337111969408?from_webapp=1&item_id=7000337111969408. Does not represent endorsement.



Case #2

Mechanism of action

- Injected fillers can lead to ophthalmic artery, central retinal artery, branch retinal artery, or posterior ciliary artery occlusion via retrograde flow^{1,2}
- Outcomes vary, no consensus on management

¹Park SW, et al. Iatrogenic retinal artery occlusion caused by cosmetic facial filler injections. *Am J Ophthalmol*. 2012 Oct;154(6):653-662.e1.
²Farnetti L, et al. A typical pattern of the facial arteries with implication for lip augmentation with hyaluronic fillers. *Academic Plast Surg*. 2014 Dec;38(5):1083-9.

Patient

- HPI: 12 y/o Caucasian boy with acute-onset central scotoma OS

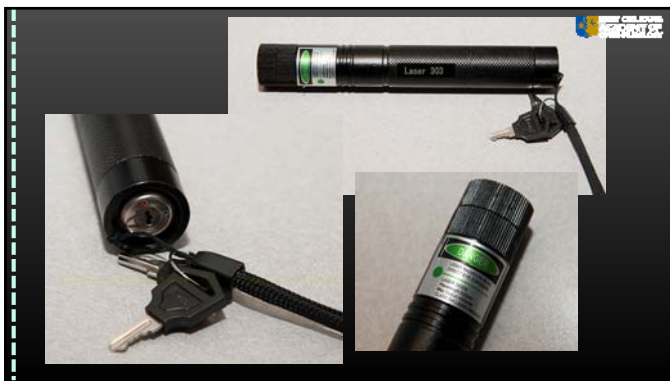
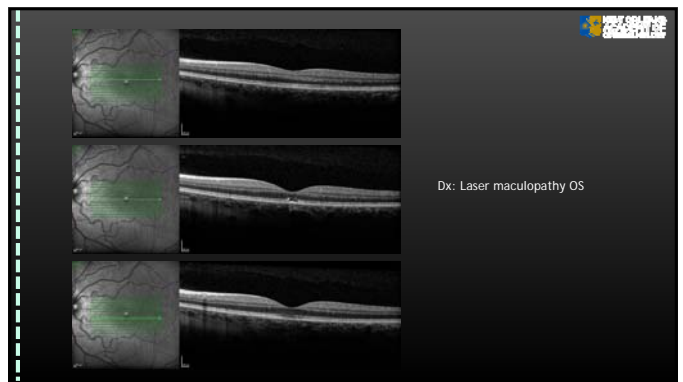
Differential diagnosis

- Idiopathic juxtafoveal macular telangiectasia
- Best disease/adult vitelliform macular dystrophy
- Solar retinopathy
- Laser maculopathy
- Cone dystrophy
- Cystoid macular edema
- Drug-related toxicity (e.g., hydroxychloroquine)
- Poppers maculopathy



Patient

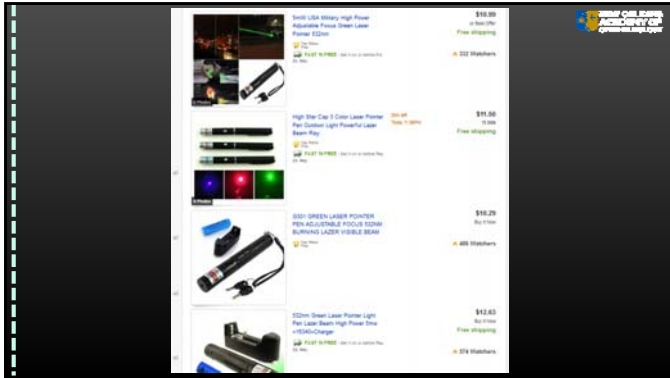
- HPI: 12 y/o healthy Caucasian boy with acute-onset central scotoma OS (Va 20/60-ec) x 1.5 weeks after playing with new laser pointer
 - Shined beam into mirror and stared at its reflection for a "few seconds"
 - Heard a "popping" sound
 - Immediately noticed a central scotoma OS, no change over interval
 - Asymptomatic OD
- SH: 7th grade honors student
 - Lives with parents
 - No substance use
 - Laser pointer was "gift from his dad", bought online from China



Laser pointers: powerful and accessible

- Typically come in 3 wavelengths:
 - Red (635 nm)
 - Green (520 nm)
 - Blue (445 nm)
- Early laser pointers from the 1980s were helium-neon gas lasers and most commonly of the red wavelength
- Today, green laser pointers are increasingly popular
 - Appeared on the market in 2000
 - Typically diode pumped solid state frequency-doubled lasers

<http://the-goldfinger.com>



Labelling of commercial laser pointers

JOURNAL OF LASER APPLICATIONS VOLUME 26, NUMBER 3 MAY 2013

Random testing reveals excessive power in commercial laser pointers

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(Received 17 December 2012; accepted for publication 11 March 2013; published 2 April 2013)

In random testing of 125 commercial laser pointers, the authors observed that 20% of laser pointers and 44% of red pointers were not in compliance with the Code of Federal Regulations (CFR), producing laser power in excess of the CFR allowed limits at one or more laser wavelengths. The measurement results are presented and the authors describe the inexpensive test bed they used. Also, they suggest physical mechanisms that could account for the hazardous levels of laser pointer emissions. © 2013 Laser Institute of America.

Key words: laser pointer, laser power, laser safety

660nm 200mW Red Laser Pointer Black
\$47.99 from lazada.com.sg. 7 seller reviews.

... 200mW high powered red laser pointer can burn matches, pop balloons and as well as others like a best ...

Wicked Lasers S3 Arctic Laser
\$299.95 from DigLasers.com

753 Arctic Pro Spyder III Wicked Lasers 1 Watt Blue Laser pointer produces a powerful beam of laser light at a beam frequency of 440nm. It has ...

Wholesale 5000mW 532nm high power green laser pointers can ...
\$23.99 from DigLasers online store.

5000mw 532nm high power green laser pointers focus from multi/pop balloons/ban ...

Super-powerful 405nm Focussable Violet/Blue Laser Pointer Torch

Back to our patient

- With observation, pt's vision steadily improved and scotoma became less noticeable although still mild distortion with central vision
- Va OS improved from 20/60+ ecc. → 20/25
- No more laser pointers allowed in the home

1 month post-injury

1 month post-injury

FDA regulations vs. our patient's laser pointer

- Laser pointers generally fall into these categories¹:
 - Class II: Laser pointers operating at <1 mW
 - Class IIIA: Laser pointers operating at 1-5 mW
- According to the FDA, lasers >5 mW power may not be marketed as "laser pointers"
- Pt's laser sent to MIT for testing: mislabelled as Class IIIA
 - Found to be Class IIIB; can cause retinal damage with <1/100s of exposure

	Labelled	Optical Spectrum Analyzer
Wavelength	532 nm	532.5 nm
Max. output (power)	"<500 mW"	71 mW w/ diffraction attachment 100 mW w/out diffraction attachment
Safety classification	Class IIIA	Class IIIB

¹ Princeton University. Safety Recommendations for Laser Pointers.

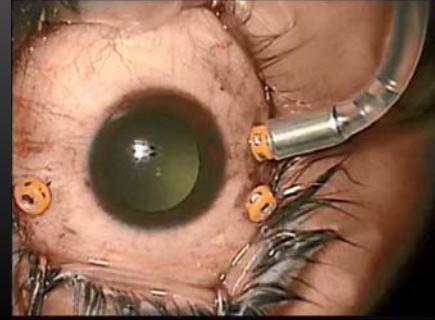
Case #3

Patient

- 24 y/o healthy Hispanic female with poor vision OD x 1 year
 - POH: No trauma or prior surgery; never had an ophthalmic exam
 - FH: No ocular disease
- Exam
 - Va HM OD, 20/20 OS
 - DFE OD with large vascular lesion with feeder vessels in superior mid-periphery and macula-involving retinal detachment with overlying fibrosis, OS wnl



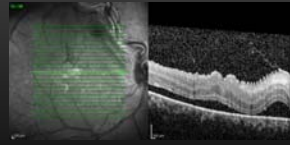
CYW: 23g PPV/IVK/MP/EL/en bloc tumor resection/AFX/1000 cs SOI OD



*Wang CY. Transretinal Feeder Vessel Ligation and En Bloc Resection of a Retinal Capillary Hemangioblastoma. *Am J Ophthalmol.* 2022 May;237:e3-e5.

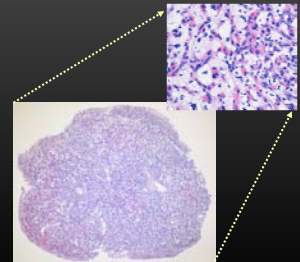


OD, 0:56



Post-operative course

- Pathology demonstrated numerous stromal cells with vacuolated cytoplasm admixed with endothelial-lined vessels
- Postoperative vision improved from HM → CF @ 3' with attached retina
- Systemic work-up negative for von Hippel-Lindau, genetic testing pending
 - No ocular abnormalities observed in family members

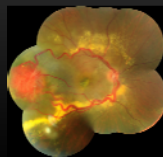


*Wang CY, Shetlar DJ, Beltman B. En Bloc Resection of a Retinal Capillary Hemangioblastoma in a Young Female. *Ophthalmology.* 2018 Aug;125(8):1188.



Diagnosis & management plan

- Dx: Retinal capillary hemangioblastoma with concurrent C-TRRD OD
- Plan: 23g PPV/chandelier endoillumination/IVK/MP/en bloc tumor resection/AFX/EL/1,000 cs SOI OD with video highlighting:
 - Technique of bimanual feeder vessel ligation with 10-0 Prolene suture
 - En bloc removal of lesion through sclerotomy
- Sent for work-up of von Hippel-Lindau (VHL) syndrome



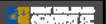
<https://www.aars.org>



Retinal capillary hemangioblastoma (RCH)

- RCHs can be an isolated retinal vascular hamartoma or be associated with von Hippel-Lindau syndrome (must be ruled out)
 - VHL is an AD disease arising from a tumor suppression gene mutation on chromosome 3p25-26¹
 - Can cause tumor formation in the brain, kidneys, pancreas, spinal cord, adrenal glands, and reproductive organs
- Treatment options include observation, laser photocoagulation, PDT cryotherapy, radiotherapy, and vitreoretinal surgery

*Maier EA, et al. von Hippel-Lindau disease: a clinical and scientific review. *Eur J Hum Genet.* 2011;19(6):617-23.






thank you / questions

contact: <christina.weng@bcm.edu>

Do We Have a Cure for Floaters Yet?



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 New Orleans Academy of Ophthalmology 72nd Annual Symposium
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youth
middle-age
elderly

Seigel J, Sherman RH, Coleman DJ. To see the invisible—the quest of imaging vitreous. In: *Vitreous in Health and Disease* [J. Seigel, ed]. New York: Springer; 2014:137.

Disclosures

- Alcon, Allergan/AbbVie, Alimera Sciences, REGENXBIO, Novartis, Regeneron, DORC, Genentech, Opthea (consultant)
- DRCR Retina Network, Alimera Sciences, AGTC (research)
- Springer Publishers (royalties)



What do your floaters look like?



https://www.eyemurder.com.au/floaters-eyeballs-Floaters
 https://thecommunity.com/2016/06/06/floaters-are-you-getting-rid-of-those-peaky-eye-floaters-81100

What are floaters?


- Visual phenomena caused by vitreous opacities casting shadows on the retina
 - Commonly associated with age/myopia-related vitreous liquefaction/degeneration
 - Symptoms may suddenly increase with the onset of a posterior vitreous detachment (PVD)
- Myodesopsia (Greek, Myiodes “protector against the flies”) = the perception of floaters
- One of the most common reasons that patients present to eye care providers

http://www.eyemurder.com
 Wang M, Salloum AA, Seigel J. Vitreous opacities: adhesion and traction. In: *Vitreous in Health & Disease* [J. Seigel, ed]. Springer, New York, 2014:302.

Impact on vision quality

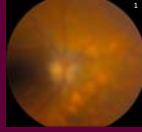
- Patients often complain of a “ghost”, “veil”, “frosted glass”, “spider web”, “jellyfish”, “glass noodle”, “gnat”, “string” that may cause an incomplete scotoma, transient visual obscuration, or decreased contrast sensitivity
 - Sx often worse in setting of bright, clear skies and computer screens
- 76% of people see floaters, and 33% report vision impairment because of their floaters¹
 - Floaters may a negative impact on the quality of life for some
 - Patients <55 y/o willing to accept 7% risk of blindness to remove floaters²



Wang M, Seigel J, Schneider MC, North CL. Prevalence of vitreous floaters in a community sample of middle-aged women. *Int J Ophthalmol*. 2013;6(1):40-45.
 Wang M, Kim WY, Tang TP, et al. Quality of vision associated with vitreous floaters. *Acta Ophthalmol*. 2013;91(2):180-5.





Assessing floaters

- First and foremost, rule out masqueraders:
 - Retinal tear/detachment
 - Vitreous hemorrhage (from proliferative diabetic retinopathy, trauma, hemorrhagic PVD)
 - Uveitis, especially posterior uveitis
- Perform a careful exam
 - Slit beam at 45°, have patient look up/down/straight
 - Slit beam with 90D lens axially on optic nerve, pull back slightly to assess PVD status, then have patient look in extreme gazes
 - B-scan, SLO, and OCT can depict floaters but generally unnecessary



<http://www.medscape.com/visual/floaters.pdf>

TABLE 2. PROPOSED DEFINITIONS TO FACILITATE GRADING VO SEVERITY.

Definitions of VO Severity	
	Asymptomatic: No visual disturbances; opacities are rarely noticeable/can be picked up in clinical exam, but patient may not be aware
	Mild: Opacities are noticeable to the patient but just slightly bothersome; do not interfere with vision or functions of daily visual activity (DVA)
	Moderate: Opacities are bothersome enough to impact vision and interfere somewhat with functions of DVA such as working or driving
	Severe: Opacities are extremely bothersome; highly impacts quality of life and significantly interferes with functions of DVA such as working or driving

https://www.bmcophthol.com/content/12/1/102/102111_AccessToViewFullTextOpenAccess2020Communi2020supplement.pdf

Treatment options

- Observation
- Pars plana vitrectomy
- YAG vitreolysis

Treatment options

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Observation

- Should be recommended to the vast majority of patients, especially upon initial visit
- Discuss and document symptoms
 - Explain what floaters are (snow in a snow globe analogy)
 - * Neuroadaptation
 - * Continued degeneration of vitreous may lessen symptoms over time
 - Ask how floaters are impacting their quality of life specifically
- Review treatment options
 - Establish an agreed-upon observation period (6 months-1 year)
 - Set up a follow-up appointment, encouraging the patient to contact your office sooner if symptoms worsen



Pars plana vitrectomy

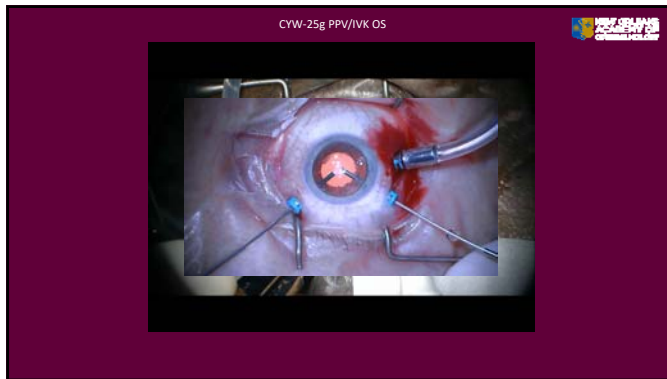
- Important to explain that while their symptoms should be drastically improved, impossible to remove 100% of floaters
- Costly, but quite effective overall for symptom relief
 - Patients reported 69% improvement at POM #3 in SRI (self-reported impairment index, based on a modified Visual Quality of Life questionnaire)¹
- In era of small-gauge vitrectomy surgery, relatively safe²
 - Risk of retinal tears/detachment ranges from 0-30% in the literature^{3,4}
 - * Importance of hyaloid elevation is debated
 - Other usual PPV-related risks must be discussed with patient including cataract formation, endophthalmitis, and anesthesia-related issues

Yoshida H, Kurihara M, I, Saito K. 235 pars plana vitrectomy for vitreal floaters: prospective assessment of subjective self-reported visual impairment and surgery-related risks during the course of treatment. *Graefes Arch Clin Exp Ophthalmol*. 2018;56(10):1878-86.

Gruber MG, Stein JD, Zandi N, et al. Complication Rates After Pars Plana Vitrectomy Among Medicare Beneficiaries. *JAMA*. 2020;323(10):1066.

Wu H, Tan C, Huang L, et al. Long-term Safety of Vitrectomy for Patients with Floaters. *OPV*. 2014;10:2142.

Wu H, Saito K. Safety of vitrectomy for floaters. *Ann Ophthalmol*. 2011;53(10):1077.



September 2017

YAG Laser Vitreolysis vs Sham YAG Vitreolysis for Symptomatic Vitreous Floaters

A Randomized Clinical Trial

Chuang P, Shah, MD, MPH¹, Jeffrey S. Hertz, MD²

¹ Author Affiliations | ² Article Information

JAMA Ophthalmol. 2017;35(9):908-913. doi:10.1001/jamaophth.2017.2308

- Single-center, masked, sham-controlled RCT of 52 eyes with symptomatic Weiss rings assigned to YAG vitreolysis vs. sham YAG (control)
- Primary 6-month outcome was subjective change of a 10-point visual disturbance score, 5-level qualitative scale, and the NEI-VFQ-25
- YAG laser group reported greater symptomatic improvement (54%) than controls (9%); difference in objective improvement also confirmed
- No differences in adverse events seen between groups

Treatment options

- Observation
- Pars plana vitrectomy
- YAG vitreolysis

Assessment of Vitreous Structure and Visual Function after Neodymium:Yttrium-Aluminum-Garnet Laser Vitreolysis

Lee JJ, Nguyen BA, James Spivey-Cox BA, Fu H, PhD, Kowalski M, Sr, BS, Jayaram-Narayan, PhD, Kowalski H, Solomon, PhD, FRCGS, James Koloski, PhD, J. Inlay, MD, FRCOphth

Purpose: Neodymium:yttrium-aluminum-garnet (Nd:YAG) laser treatment is performed on vitreous floaters, but studies on structure and functional effects with objective outcome measures are lacking. This study evaluated the effect of Nd:YAG laser vitreolysis on vitreous structure and visual function.

Ophthalmology. 2019 Nov;126:1517-26.

- 132 participants: 35 controls without floaters, 59 with untreated vitreous floaters, 38 with vitreous floaters s/p YAG vitreolysis
 - Of the latter group, 25 were dissatisfied and seeking PPV, 13 were satisfied
- Compared to controls, pts with untreated floaters showed worse NEI-VFQ-39 results and 57% greater vitreous echodensity (VE) with worse contrast sensitivity function (CSF)
- Compared to untreated eyes with vitreous floaters, YAG-treated eyes had 23% less VE ($P < 0.001$), but no differences in NEI-VFQ-39, BCVA, or CSF

YAG vitreolysis

- Utilizes Nd:YAG laser to target and vaporize vitreous floaters
 - Use a YAG laser with coaxial illumination
 - Typically requires at least 3-4 mJ/pulse, total of 150-1,000 pulses; multiple sessions may be required
 - Must take care to avoid focusing energy on the lens or retina
- Less costly than PPV, but carries risks due to limited study
 - Adverse effects that have been reported include cataract, vitreous hemorrhage, posterior capsular rupture, epiretinal membrane, glaucoma, and retinal detachment¹⁻⁴
- Best candidates have a confirmed PVD in the mid-vitreous cavity

Yuang W, Wang T, Chen Y, et al. Intraoperative Posterior Lens Capsule Rupture and Subsequent Complications due to Nd:YAG Laser Vitreolysis for Vitreous Floaters: A Case Report. *Ophthalmic Surg Lasers Imaging Retina.* 2018;48(11):1214-7.

Cohen LA, Moore JT, Chopra V, et al. Refractory open-angle glaucoma after neodymium:yttrium-aluminum-garnet laser lysis of vitreous floaters. *Can J Ophthalmol.* 2015;50(1):173-6.

Narayanan R. Posterior capsule elongation with vitreous hemorrhage caused by neodymium:yttrium-aluminum-garnet laser vitreolysis. *May J Ophthalmol.* 2018;34(4):356.

Yoshida RA, Cheng QF, Holly AL, et al. Retinal Complications after Vitreous Aluminum-Garnet Laser Vitreolysis for Vitreous Floaters. *Ophthalmic Surg Lasers Imaging Retina.* 2021 Nov;51(11):1810-3.

Efficacy and safety of Nd:YAG laser vitreolysis for symptomatic vitreous floaters: A randomized controlled trial

Gustafson D, Ludvig J, Henrique Gemelli T, Guilherme M Nunes R, Pedro D Semerariassai T, Margara Zanatta T

Randomized Controlled Trial | Eye J Ophthalmol. 2021 May;31(5):809-814. doi: 10.1177/1120672120968762. Epub 2020 Nov 4.

- 21 patients randomized to YAG vitreolysis vs. observation
- On 10-point visual disturbance scale
 - YAG-treated eyes improved by mean of 4.7 points ($P < 0.001$)
 - Control group improved by 2.1 ($P = 0.09$)
- YAG-treated eyes reported greater symptomatic improvement (77%) vs. controls (25%)
- NEI-VFQ-25 revealed improved general vision and mental health at 6 months in YAG-treated eyes vs. controls ($P < 0.05$)
- No sig. difference in contrast sensitivity or adverse events between groups



Comparing the options

	Observation	PPV	YAG vitreolysis
Efficacy	★	★★★★	★★★
Cost	★★★★	★	★★★
Risk profile	★★★★	★	★★★?

Takeaways

- Vitreous floaters are common and can be visually disturbing
- Rule out other ocular pathologies in a patient presenting with new floaters
- Current options for floater management include observation, PPV, and YAG vitreolysis; each has its own risks/benefits
- In general, observation should be tried for at least 6 months before proceeding with a more invasive intervention
 - YAG vitreolysis less well-understood than PPV in terms of its efficacy and associated risks, and should be pursued with caution at this time



Which option is best?

- One interesting point in the study by Shah & Heier was that 25% of patients reported 0% improvement in symptoms despite the majority of those having objective improvement¹
- Cochrane review:

No YAG laser vitreolysis versus pars plana vitrectomy for vitreous floaters.
 Shahzad S, Sheier S. *JAMA Ophthalmol*. 2017;35(11):1215-1221. doi:10.1001/jamaophth.2017.1111

Abstract: OBJECTIVE: To evaluate the efficacy and safety of YAG laser vitreolysis compared with pars plana vitrectomy (PPV) for the management of symptomatic vitreous floaters. DESIGN: Randomized clinical trial. SETTING: Tertiary care academic medical center. PARTICIPANTS: 100 patients with symptomatic vitreous floaters. INTERVENTIONS: YAG laser vitreolysis (n=50) or PPV (n=50). MAIN RESULTS: No difference in the reduction of floaters was observed between the 2 groups. CONCLUSIONS: YAG laser vitreolysis and PPV are both effective for the management of symptomatic vitreous floaters.

- There are no large head-to-head studies comparing YAG vitreolysis and PPV
 - Deeper understanding about YAG vitreolysis is also needed

¹Shah S, Heier S. YAG Laser Vitreolysis vs. Pars Plana Vitrectomy for Symptomatic Vitreous Floaters. *JAMA Ophthalmol*. 2017;35(11):1215-1221.

thank you!

contact: <christina.weng@bcm.edu>



SYMPTOMATIC VITREOUS OPACITY PATIENT REFERRAL FORM

Patient Information:
 Name: _____
 Address: _____
 Phone: _____

Referral Information:
 Referring Physician: _____
 Referral Date: _____

Chief Complaint:
 I have noticed _____ in my vision since _____.

History of Present Illness:
 The floaters were first noticed _____ and have been increasing in number and size over the past _____.

Physical Examination:
 Visual Acuity: _____
 Intraocular Pressure: _____
 Anterior Chamber: _____
 Lens: _____
 Vitreous: _____
 Retina: _____
 Optic Disc: _____

Diagnosis:
 Symptomatic Vitreous Opacity

Management Plan:
 Observation
 YAG Laser Vitreolysis
 Pars Plana Vitrectomy

¹<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5422005/>