A new use for the YAG laser: vaporizing floaters

by Lauren Lipuma EyeWorld Staff Writer

Laser vitreolysis of floaters is a safe and effective alternative to vitrectomy

When a patient comes into the office complaining of floaters, ophthalmologists usually offer only 2 options—learn to live with them or undergo a vitrectomy. A little-known third option exists, however, that treats floaters in a safe, effective, and noninvasive way: vaporizing them with the Nd:YAG laser.

YAG laser vitreolysis was pioneered more than 30 years ago but never took hold as a treatment for floaters, and few doctors perform it today. But now, with new technologies optimized for the procedure and a growing awareness of it among anterior segment surgeons, YAG vitreolysis could become the standard of care for floater management.

How does it work?

Vitreolysis was pioneered in the 1980s by European ophthalmologists **Franz Fankhauser, MD**, and **Daniele Aron-Rosa, MD**. **John Karickhoff, MD**, Falls Church, Va., was one of the first surgeons to perform vitreolysis in the U.S. Dr. Karickhoff wrote the only textbook on vitreolysis and developed several surgical contact lenses to assist with floater visualization.

The procedure is simple—a Q-switched Nd:YAG laser, optimized for use in the posterior segment, vaporizes the floater material. Instead of projecting a parallel beam of light, the laser emits a beam that converges to a focal point 8 microns in diameter. With the help of a surgical contact lens, the physician uses the laser to locate the floater and focus the beam on it.

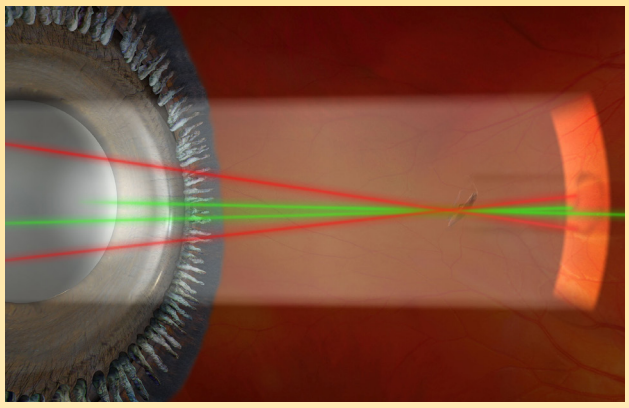
When the laser is fired, the temperature of the floater at the focal point rises to 4000 degrees Celsius, creating plasma that fills the convergence angle and converting a small amount of solid floater material to gas. Over the course of 1 or 2 treatment sessions of several hundred laser shots, floaters can be rendered small enough that they no longer disturb the patient's vision.

Overall, floater vitreolysis has been shown to be incredibly safe and effective, with only minor instances of rise in intraocular pressure. Dr. Karickhoff reports on his website that he sees success in 95% of cases with a complication rate of 0.1%.

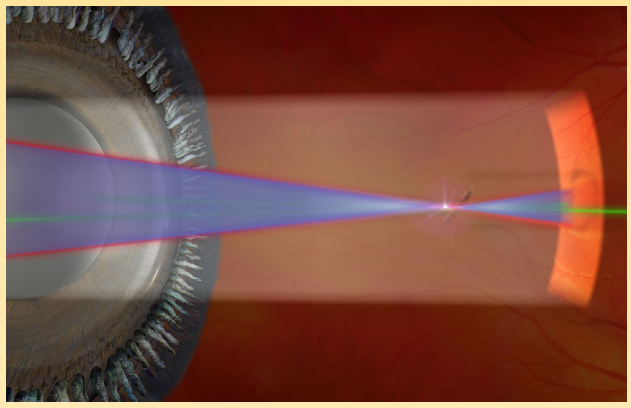
Why do so few physicians perform this procedure?

Floater vitreolysis is a noninvasive procedure that involves equipment

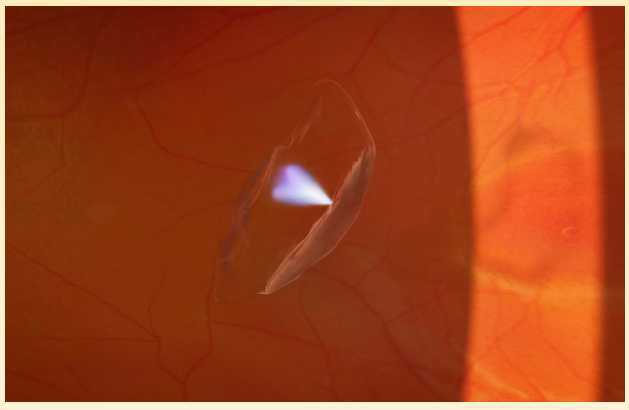
YAG vitreolysis: How it works



To accurately treat floaters, the slit lamp illumination beam (visible light), slit lamp observation beams (green beams), HeNe aiming beams (red beams), and the infrared treatment beam must share the same axis.

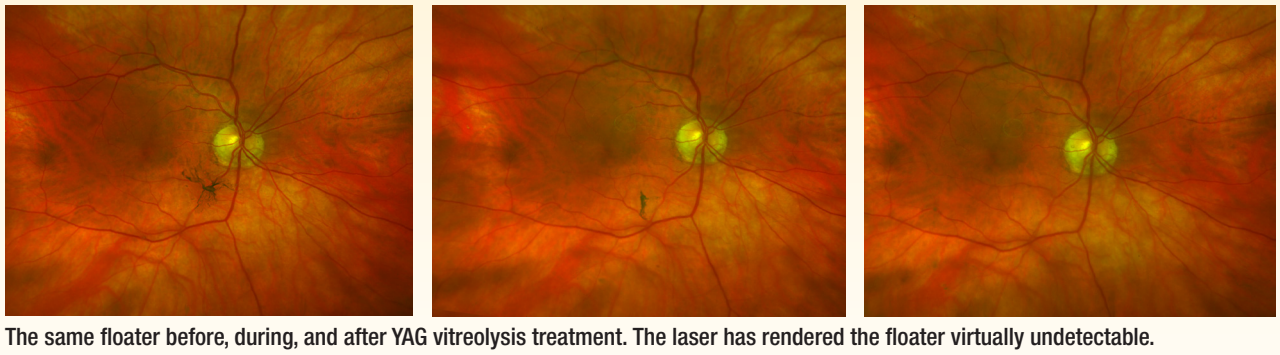


The laser's infrared treatment beam (blue) converges at an angle of 16 degrees to a focal point 8 microns in diameter. The treatment beam diverges past the focal point, so it does not harm the retina.



When the laser is fired, the floater material becomes ionized, creating plasma that fills the cone angle.

Plasma formation creates a shock wave that vaporizes the floater tissue, creating gas bubbles that float upward. The gas bubbles reflect most of the light and shock wave back toward the lens, preventing the laser's energy from reaching the retina.



The same floater before, during, and after YAG vitreolysis treatment. The laser has rendered the floater virtually undetectable.

Source: Karl Brasse, MD

anterior surgeons already use in their practices—so why do so few of them perform it? The first and most obvious reason is that most physicians simply don't know that vitreolysis is an option.

The first studies showing the effectiveness of vitreolysis in the 1980s were published in European journals and involved small numbers of patients. Even today, little literature exists on the topic—a search of the National Library of Medicine's PubMed database revealed that less than 10 studies regarding floater vitreolysis have been published since 1993.

Because only a handful of ophthalmologists perform vitreolysis, there is virtually no instruction on it. Residents and fellows don't learn the procedure during their training and there are few courses offered at academic meetings. However, some surgeons who use vitreolysis have begun to train others in the technique. **Karl Brasse, MD**, Vreden, Germany, launched the first ever European floater vitreolysis course in January of this year, with more than 40 ophthalmologists from 12 countries in attendance.

Without knowing about vitreolysis or how to perform it, the safest treatment physicians can offer for floaters is to do nothing. According to **I. Paul Singh, MD**, in private practice, the Eye Centers of Racine & Kenosha, Wis., after being told that nothing can be done, patients become conditioned to not complain about floaters, and without patient complaints, there is no need to find an alternative procedure.

In the past, even when physicians did learn about vitreolysis, most didn't add it to their surgical repertoire. Part of the reason is that the procedure was, in a way, ahead of its time. Until recently, YAG lasers weren't designed for use in the posterior segment and surgical contact lenses weren't optimized for visualizing floaters, making it difficult to achieve good outcomes.

Ellex Medical Lasers (Adelaide, Australia) tackled this issue in 2012 with the debut of the Ultra Q Reflex multi-modality YAG laser. The Ultra Q Reflex integrates a slit lamp into the laser design and has a coaxial illumination tower, so that the light source, green observation beams, HeNe aiming beams, and infrared treatment beam all share the same axis. This new technology, paired with newer contact lens designs, offers better outcomes with vitreolysis than ever before.

A low risk, high benefit procedure

After entering practice and focusing on cataracts and glaucoma, Dr. Singh never thought he would be doing anything in the vitreous. That changed when one patient came to him year after year complaining of a floater disrupting his vision.

"Every year he'd ask me, 'What can I do about it?'" Dr. Singh recalled. "I kept saying the same thing everyone else says—you'll get used to it eventually, don't worry about it, nothing can be done."

The patient became so frustrated, however, that he flew to the east coast to have Dr. Karickhoff treat it with the YAG laser. Three months later, he visited Dr. Singh again, and his floater had disappeared.

"I was shocked because it was a huge floater, and it was gone, and his symptoms were relieved," Dr. Singh said. Seeing this patient's incredible results inspired Dr. Singh to begin performing the procedure himself.

"When I saw these patients coming back, in the first 10 or 15 cases [I did], I realized this is something that's truly needed in our portfolio of procedures," he said. "If you look at anything we do in ophthalmology, there's always that risk/benefit ratio: how much of a risk are we taking, how much of a benefit are we getting. To me, this is a relatively low-risk, high-benefit in-office procedure that takes 10–20 minutes. I think it's very valuable."

Dr. Singh thinks that treating floaters with laser vitreolysis has the same impact on a patient's vision and quality of life as removing cataracts.

"I don't think we appreciate the impact that floaters have on daily functioning and quality of vision," he said. "There's the potential to help a lot of people. This is going to become, in my opinion, standard of care in the next 5 years." **EW**

Editors' note: Drs. Brasse and Singh have financial interests with Ellex.

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