



SOARING Rx

BY DR. DANIEL L. JOHNSON

Eye Floaters

One early spring evening after work, Darrell turned off his office lights, and against the dark saw little flashes like lightning in his peripheral vision. He instantly remembered that his mom had told him she saw flashes when she had a retinal detachment. This had been sort of an unhappy time for her, so he felt anxious.

But his vision seemed clear as he went home, and his eye was comfortable, so he slept on it. He was relieved when his eye doctor said to come right in when he phoned the next morning.

After much peering and examining, she said, "You have a vitreous detachment. It's just an aging change, but sometimes it leads to retinal detachment, so I want to see you again next week."

He felt a little hurt to hear that Age had cut one more small notch in his belt and felt glad that nothing devastating had happened.

But he did notice, after that, some specks dancing gracefully around, getting somewhat in the way of fine print, especially on his computer screen or in bright light. Then, when the soaring season began, there were lots of little specks dancing gracefully against the sky. As he flew, every so often, he thought one was a bird or distant plane.

He began to wonder whether this was a risk for seeing other aircraft.

Are Ocular Floaters Important to Pilots?

If you're wondering what an ocular floater is, then you're still young, with optically pure clear eyes.

From the point of view of the victim, a "floater" is any little spot or blur in our vision that shows up when we look at a featureless background, especially in bright light, and that moves or jiggles when our eyes move.

From the point of view of the eye doctor, floaters are various little imperfections in the watery core of the eyeball, the *vitreous humor*. As in the archaic sense of humor, "fluid or juice of an animal or plant," which is not comical. Especially if your vitreous is not glassy clear ("vitreous" means "glassy").

To make this plainer, the eyeball is filled with a clear-as-glass (vitreous) wet gel (humor). Various imperfections cause motes to form within it when aging causes the proteins which form the

gel to clump. When light shines into the eye (something we seek out, because vision is a Good Thing), any speck may cast its tiny shadow on the retina.

We see this as a (hold your breath) shadowy speck. The eye is continually in motion, and the gel jiggles accordingly, making the shadows seem to float around.

This feels like a problem only if the floaters are in front of the *fovea*, the tiny spot in the central retina that gives us detailed vision. Then it can be annoying, or can cripple our ability to see fine detail if there is a flock of central floaters.

The Problem with Floaters

Sadly, the brain is so very good at filling in gaps in our conscious picture of what's around us that it will invent stuff, filling in gaps with familiar patterns or adjoining textures.

On the favorable side, this lets us read degraded text and respond instantly when that is urgent without having to wait for all the dots to be connected. On the other hand, the filled-in gaps sometimes contain important detail. We've probably all had a car on the cross-street emerge unexpectedly from our windshield A-pillar.

This is important for see-and-avoid because the airplane we're going to collide with begins as a gnat-sized speck – insect, bird, or airplane depending on the distance our brain assumes. This is made more difficult if we have tiny bits in the eye that hide this speck, or that cast their own shadow and mimic something.

False Impressions

We understand that "first impressions" are often correct. Yet our instantaneous "eureka" experiences are not reliable. We make mistakes repeatedly if we do not verify what we think at first is true.

In medicine, decades ago, German physicians admired those who could reach a diagnosis instantly by recognizing parts of a familiar pattern. This is great fun, and makes us look magically smart. They called it *blinkreit*, which seems to have spawned the Malcolm Gladwell book, *Blink*.

GLIDER TIRES & TUBES



DESSER
TIRE & RUBBER CO.
Since 1920

Large selection of **GLIDER** tires and inner tubes in stock. We supply over 100,000 aircraft tires and tubes to 85 countries annually. From Glider through 747, we can meet your needs from our stock of over 25,000 units.

www.desser.com

Aircraft Tires, Tubes, Batteries
Factory Authorized Distributors:

AERO CLASSIC **GOODYEAR**
CONDOR **SPECIALTY TIRES**
AIR-CRAFT TIRES OF AMERICA, INC.

MICHELIN **Gill**

1-800 AIR-TIRE (247-8473)

Desser Tire & Rubber Co., Inc.
6900 Acco St. Montebello, CA 90640
3400 Chelsea Ave. Memphis, TN 38108
Toll Free: (800) 247-8473 • Local: (323) 721-4900
Fax: (323) 721-7888 • Email: sales@desser.com

2 locations for the fastest delivery !



Yet in medicine, and in every occupation in which accuracy is crucial (or error damaging), self-doubt is important. We must be continually willing to discover ourselves wrong, *especially* if we are completely confident in our first impression.

Aviation is not different. We must always seek confirmatory evidence of what seems to be true, lest we be deceived by illusion.

Floaters obscure detail of the scene before us. This degrades the accuracy of pattern-recognition, and increases error rates. Will a distant fast-moving aircraft be obscured by the shadow of a floater? The aircraft with which we will collide does not move on our retina, so our motion-detecting system fails. The floater fails the flyspeck-detecting system.

Floaters also degrade reading of text on displays and charts (if you're old enough to remember what those are), and in the federal regs and club rules. (Perhaps this is a reason that so few airplane pilots over 60 who see me for flight physicals actually have read any of the rules.)

We are like the ducks in a shooting gallery: the more time we spend crossing the target zone, the more likely we are to get hit. Aging is pure time and chance as much as it is senescence.

What Are Floaters Made of?

It's my sad duty to tell you that these annoying spots are part of *you*. No

maleficent force has inserted interstellar dust into your eyeball while you sleep.

A few floaters are lifelong, a result of slight imperfections at birth. For example, the eye forms as an extension of the fetal brain, at the front of which is the cornea and lens. During the first 10 weeks of fetal life, the ophthalmic artery to the eye has an extension through the center of the eyeball, the *hyaloid artery*. This then regresses, normally leaving a clear canal through the center of the vitreous humor.

Sometimes this regression is incomplete, leaving (usually tiny) free remnants, which are seen as floaters (mostly in bright light).

Anytime during life, infection or inflammation may affect an eye. There are many diseases that may be involved. Floaters can be tiny clumps of protein, white blood cells, or tiny hemorrhages.

In general, *new* floaters are a signal to urgently visit the ophthalmologist if light is painful or the eye itself is red or painful, if vision is blurred, or there seem to be flashes of lightning in your peripheral vision.

Having said that, acquiring floaters is also a natural aging change. If you're over 60, you've noticed that resilience and elasticity have been replaced by stiffness and sagging. As part of this general process, without your having noticed, the gel of the vitreous humor (glassy fluid) shrinks a little and may detach from the retina. This is called a

"vitreous detachment."

Normally, this simply creates some loose debris – new spots of interstellar dust in our vision. Rarely, the retina will tear. This is noticed as lightning flashes, and if it detaches, a grey curtain will be drawn across part of the visual field.

Sudden loss of vision is always an emergency, for much can be saved if the problem is not neglected.

Clues to hurry to an ophthalmologist, to summarize, are newly blurred vision, lightning flashes, light hurting the eye, redness around the rim of the cornea, and eye pain. The feeling of something in the eye should go away in a few minutes (a lash) or a few hours (a slight scratch).

Having said that, I'm continually amazed at how some people fail to notice severe vision changes. "I went to my eye doctor," the middle-aged college dean said to me recently, "And he found that I'd gone blind in my right eye. He took a cataract out, and my vision is much better."

Or, "I can't read street signs, but I can read road signs – so my wife navigates." He chuckles, adding, "If it gets any worse, maybe I'll talk to my eye doctor." I ask who that is, and he says, "Wal-Mart."

At the other end of the pendulum is the perfectionist who notices every speck, and may try hard to persuade the ophthalmologist to vacuum out the vitreous and replace it with clean fluid. ■

STEMME
803.726.8884 / info@stemme.com
stemme.com

GRAVITY,
OUTSMARTED.
S12

INTRODUCING THE
STEMME TWIN VOYAGER S12.
THE ULTIMATE HIGH-PERFORMANCE AIRCRAFT.

Do Floaters Ever Go Away?

Fortunately, gravity helps. As the months flow by, floaters tend to sink, migrate away from the fovea, and become less bothersome.

In addition, floaters are seldom obvious in dim light. The reason is optical: in dim light, the pupil is dilated (4-9 millimeters in diameter, varying with individuals) and every part contributes rays of light to every rod and cone. This causes the floater to become a small area that's slightly foggy.

Contrariwise, in bright light, the pupil is small (2-4 millimeters, across individuals), so that the floater is more likely to cast a sharp shadow. This is why floaters are most obvious when the light is bright and the background is featureless. We elders start seeing "insects" and distant "birds" against the bright sky that move with our eyes, not with the breeze.

So time and dim light are nature's remedies.

Are Floaters Disqualifying?

No. Floaters rarely decrease best visual acuity. The FAA standard is, frankly, pretty low for the 3rd class medical. The required best vision of 20/40 doesn't satisfy me with I'm in the airport traffic pattern with such "best" vision. The question is, "How far away can you see that collision coming?" At 20/40, we're lucky if the glider or small GA aircraft is visible from the far end of the downwind leg. (See this column, July, 2011, at tinyurl.com/see-and-avoid.)

A pilot who saw me for regular flight physicals for several years told me that the reason he stopped flying was that he had so many floaters he didn't trust himself to see distant traffic. He's a careful and wise man, who shifted his time to grandchildren, performing folk music, and remodeling projects.

For the person in his shoes who feels unsafe with their floater flock, there are two remedies.

Can Floaters Be Blasted or Vacuumed Away?

Yes. When these are merely annoying, it's not worth risking even rare major surgical accidents to attempt a fix. But because floaters are visually disabling,

they are clearly worth a careful evaluation by an ophthalmologist.

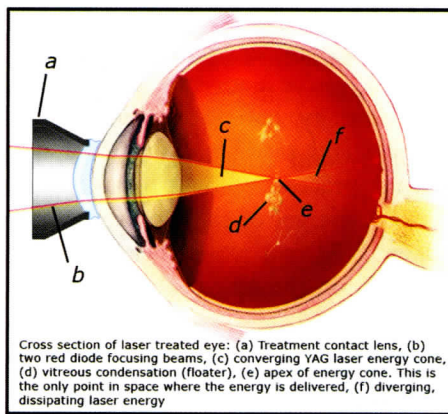
Laser Ablation of Floaters

A very few surgeons are using lasers to fry floaters. Only three ophthalmologists in the US have extensive experience with this technique. So this is not something you can ask your friendly neighborhood ophthalmologist to do for you.

Nevertheless, in these experienced practices, there is a very favorable risk. Reduction of floaters is excellent, though not always totally cleared, and serious adverse effects are almost non-existent.

It is attractive because laser surgery does not require the surgeon to poke a sharp needle into the eyeball (no risk of bleeding, retinal tears, or infection), no risk of cataract, and it's fast (two to four sessions lasting less than 30 minutes each, on successive days).

Laser ablation is aimed at destroying the most bothersome floaters, especially those located on the visual axis, not at completely cleaning out the eyeball.



Courtesy of Dr. James H. Johnson.

And there are potential troubles. The most significant is the chance of injuring a spot in the retina. This is not what we came to buy, so would be a disappointment. It is avoided by not treating floaters within about 2mm of the retina. This also means that such floaters cannot be removed by laser.

Another troublesome effect is that if too much floater material is zapped in one session, the residue can plug up the eye's drain like oatmeal in the kitchen sink. This would lead to glaucoma. It is prevented by treating the floaters in two

to four brief daily sessions to let the eye clear itself out overnight.

Sometimes the procedure just doesn't meet our hopes – the floaters are too large or numerous, and disappointment may lead to derogatory or defamatory web comments about the surgeon.

If you consider having this procedure, which is effective and safe (it has fewer poor outcomes than LASIK), first see your local ophthalmologist or optometrist for an internal examination of your eye to determine if your floaters are visible, and to make sure that you don't have any other important eye condition.

You can expect the procedure to cost in the range of \$1,500-2,000 per eye and any insurance reimbursement not worth the hassle.

Irv Arons has written an excellent summary of this procedure at tinyurl.com/irvarons-floaters that includes references. He describes European practice at tinyurl.com/EU-floaters. This summary is about five years old. An Internet search for "laser treatment of ocular floaters" reveals that this treatment is becoming more widespread, perhaps because Dr. John Karickhoff has written a textbook and designed a bespoke contact lens for surgeons.

Vitrectomy

As mentioned above, the vitreous can be vacuumed away and replaced with nice, clean salt water.

This *does* involve poking a sharp stick into your eye – actually three – and so the risks are greater.

It was developed, and is the right choice, for people who have really major clouding of vision from serious internal eye conditions.

For the person whose sight is in danger, this is very welcome. It goes well 90% of the time, more or less. However, removing the vitreous disrupts the nutrition of the lens, so most people get a cataract of the eye sooner than they would otherwise. The retina may be torn (< 1.5%) or the eye may bleed internally (< 2%). These are complications that can be very troublesome, and generally cause more floaters.

It's not fair to the eye surgeon to blandly compare this to vacuuming your



floors, for vitrectomy is a precise and fairly complex procedure in which tiny inaccuracies can cause trouble.

Essentially, a fine needle, in which is nested a minuscule blender, is inserted into the eye. The gel is liquefied by the cutter, then vacuumed out, replaced by gas and then salt water.

This was first developed in 1970, and many technical refinements have followed. 20-gauge instruments have been replaced by 23-, 25-, and now 27-gauge instruments. The smaller instruments are more comfortable for the patient and cause fewer complications. As these complex needles become smaller, they become more flexible and more challenging to guide.

Vitrectomy is used mainly to treat catastrophes such as retinal detachment, eyeball internal infection, penetrating foreign bodies, hemorrhage within the eye, and so on. In these conditions, the potential adverse outcomes are clearly acceptable, usually being less severe than the condition treated.

Complications are less acceptable when

treating a condition that is predominantly annoying. We really hate to lose an eye that was functioning, even though sub-optimally. The most common complication of vitrectomy is cataract (25-50% within 2 years). This and retinal detachment (5-10%) occur significantly less often with smaller-gauge instruments.

What to Do

Here's my free advice, for what it's worth.

1. If you have floaters, take the advice you shouted to the umpire, and have your eyes examined thoroughly by an optometrist or ophthalmologist.

2. If the floaters are visible, and you don't otherwise need eye treatment that is more important, read Irv Aron's online essay and schedule a consultation with one of the experts he names to find out whether your own floaters are best treated with laser, how much visual improvement is likely, and whether this holds any significant risks for you.

3. Waiting, after you've had your eyes checked out, is almost always perfectly

safe. It's hard to make a good eye better, and that one on the other side is not a spare.

References

Arons, I. **Using Lasers to Treat Floaters**. 2010 <http://www.tinyurl.com/irvarons-floaters>

Chirag C Patel, MD, et al. **Pars Plana Vitrectomy**. 2015. <http://emedicine.medscape.com/article/1844160-overview#a7>

Merriam-Webster Dictionary (Android app) www.m-w.com

Sommerville DN, **Vitrectomy for vitreous floaters: analysis of the benefits and risks**. *Curr Opin Ophthalmol* 2015, 26:173-176 DOI:10.1097/ICU.0000000000000150

Acknowledgments

Thanks to Dr. John Karickhoff, Dr. Scott Geller, and Dr. James Johnson, for discussing laser treatment of floaters with me by phone and email.

Illustration courtesy of Dr. James H. Johnson. ✈

A GIFT TO THE SSA FOUNDATION IS A Timeless Gesture of Support

Your Contribution will help Build the Perpetual Gift of Soaring

The SSA Foundation was established as an independent corporation in 1998 to manage and administer endowment funds on behalf of the Society. The Foundation structure provides for long-term security as well as the stability required for the management and oversight of these funds.

In becoming an SSA Foundation donor, you join an elite group of members making a significance in soaring forever.

The SSA Foundation Trustees and staff will be happy to discuss your wishes regarding a planned giving program with your tax and legal advisors.

Interested in considering a gift? If you need more information regarding the Foundation, contact:

The logo for The SSA Foundation. It features the word "The" in a cursive script, "SSA" in large, bold, white block letters with a blue outline, and "Foundation" in a cursive script. The entire logo is set against a blue background with a white glow effect.

P.O. Box 2100 • Hobbs, NM 88241-2100 • Phone: 575-392-1177 • E-mail: thessafoundation@ssa.org