

A clinician's guide to flashes and floaters

How to differentiate dangerous warning signs from normal, physiologic ocular findings

A patient complaint that we hear quite often is that of seeing floating spots in the field of vision. Occasionally, when a patient experiences these 'floaters', he or she may mention that flashes of light are also occurring. In this article, we briefly review and examine the causes of floaters and flashes.

Floaters

While most causes of floaters reside in the vitreous gel, it is important not to overlook a simple and superficial aetiology – namely, debris within the tear layer. It is not uncommon for patients to accumulate make-up or other material within their tears. These patients may have a mild foreign body sensation, or may be asymptomatic. Patients with oily tears and inspissated meibomian glands may also accumulate debris within the tear layer, which can be reported as floaters. This phenomenon is transient and the patient may report that the floaters move significantly upon blinking. There typically are no other associated symptoms, such as foreign body sensation, that could provide a diagnostic clue.

Patients with ocular allergies may also be prime candidates for this phenomenon, since the eye produces excess mucus in order to soothe the eye from the allergic assault. It is important to remember that true vitreous floaters may seem to move upon blinking, and the patient may mistakenly assume that this represents debris within the tear layer.

A tear film aetiology should only be entertained once true vitreous floaters and degeneration have been eliminated as a possible cause.

By far, the main cause of symptomatic floaters resides within the vitreous cavity. A caveat to remember: when patients complain of floaters that they can localise to one eye or the other, they are typically correct. Vitreous abnormalities present symptomatically as floaters due to shadows that they cast upon the retina. Thus, the patient can correctly determine which eye is experiencing the phenomenon.

In contradistinction, patients experiencing flashes of light can not always determine accurately in which eye the phenomenon is occurring. The patient may report that flashes are in the right visual field and may incorrectly conclude that the phenomenon is occurring in the right eye. In reality, this may ensue from stimulation of either the right nasal retina or the left temporal retina.

The vitreous gel is transparent due to the fact that it is 99% water and 1% solid elements. Of the solid portion, there are proteins, collagen filaments, and hyaluronic acid molecules. The relationship between the formed elements and the ability of hyaluronic acid molecules to retain water molecules gives the vitreous its gel consistency.

With age, there is a depolymerisation, causing the hyaluronic acid molecules to release their water molecules and form lacunae, pockets of liquefied vitreous. The collagen filaments

coalesce into collagen fibrils, causing further breakdown of the vitreous gel structure. This process is known as vitreous degeneration and syneresis.

The fibrils may 'float' within the liquid vitreous, giving the patient a sensation of floaters. The floaters here will be small, few in number, and may have a linear appearance. They will move coincidentally with eye movements. These floaters are particularly noticeable against a bright background – a sunny sky, a white page, or a bare white wall. Patients rarely see vitreal floaters in dim illumination.

With the accumulation of lacunae, the vitreous body loses support, and the vitreous framework contracts. Liquefied vitreous escapes to the retrohyaloid space and the vitreous completely separates from the sensory retina, resulting in posterior vitreous detachment (PVD). An annular ring corresponding to the attachment of the posterior vitreous will be seen floating over the posterior pole. The shadow from this annulus will be perceived as a large floater, and may resemble a smoke ring or an insect.

Another cause of floaters is vitreous haemorrhage. A PVD that encounters an area of vitreoretinal adhesion can cause a tractional tear in the retina. If a retinal blood vessel is involved, subsequent leakage into the vitreous cavity and retrohyaloid space will occur.

Patients with vitreous haemorrhage initially report a multitude of small floating spots in their vision, which subsequently enlarge and may take on a red or purple hue. A precipitous decrease in vision may be encountered, depending upon the extent of the haemorrhage.

In addition to tractional tears, a very common cause of vitreous haemorrhage is spontaneous leakage of a neovascular membrane in proliferative retinopathy (e.g. diabetic, sickle cell, venous occlusion or Eale's disease). Occasionally, a vitreous haemorrhage can occur from a choroidal neovascular membrane in macular degeneration.

When attempting to differentiate the cause of a vitreous haemorrhage, it is crucial to consider the underlying medical and ocular history of the patient.

Patients with posterior uveitis and vitritis will frequently complain of multiple floaters, often with associated decreased vision. Biomicroscopic evaluation of the vitreous will show a significant accumulation of white blood cells adherent to the framework of the vitreous gel. A common cause of this clinical picture is active toxoplasmosis. Here, there will be a 'headlights in a fog' appearance corresponding to an inflamed retina and choroid with a dense overlying vitritis. Ophthalmoscopic observation

of the posterior pole may be difficult due to accumulation of vitreal cells.

Another common cause of vitritis is pars planitis. Here, the patient is typically well systemically, but complains of multiple floaters and decreased vision, often due to cystoid macular oedema. The vitritis can be so significant that it disrupts the vitreous framework causing a collapse with posterior vitreous detachment. Discounting trauma, posterior uveitis and vitritis is the typical cause of PVD in younger patients.

A relatively common vitreous anomaly that occasionally causes floaters is asteroid hyalosis. Asteroid bodies are calcium soaps that attach to the vitreous framework. The bodies move slightly with eye movement, but always return to their original position. This condition is typically unilateral or asymmetric and is encountered in older patients. There is arguably a relationship between asteroid hyalosis and systemic vascular disease, though conclusive proof does not exist.

Asteroid bodies are white, but may appear golden or glittering during ophthalmoscopy. The clinical picture can be quite dramatic, even to the point of completely obscuring the posterior pole. Still, vision is rarely significantly affected. In most cases, complaints of floaters with asteroid hyalosis are uncommon, since the asteroid bodies demonstrate minimal movement. Asteroid hyalosis must be quite dense before floaters are noted.

A similar condition to asteroid hyalosis is sychisis scintillans. This is a rare bilateral vitreous disorder involving an accumulation of cholesterol crystals. The crystals settle in the inferior vitreous while the eye is at rest and float freely in the liquid vitreous as the eye moves.

Unlike asteroid hyalosis, sychisis scintillans is rarely encountered in clinical practice, since it is believed to be an end-stage disease seen only in blind, severely damaged eyes.

Flashes

Flashes, or photopsiae, typically result from a mobile vitreous mechanically tugging on portions of the retina. These areas of vitreoretinal adhesion include the optic disc, macula, along retinal vessels, along areas of chorioretinal scarring and RPE hyperplasia, at the vitreous base, at vitreoretinal tufts, and along the border of lattice retinal degeneration.

When the vitreous pulls upon areas of vitreoretinal adhesion, the photoreceptors are mechanically stimulated. Keep in mind that the retina is a 'dumb' animal when it comes to recognizing stimuli; retinal cells are incapable of

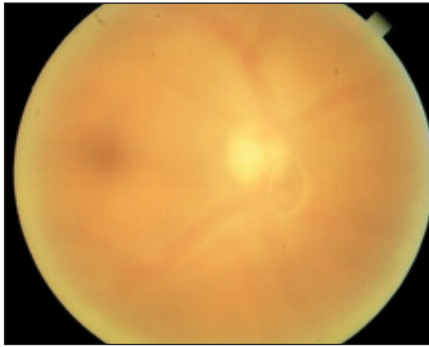


Figure 1 Recent PVDs are readily observable to ophthalmoscopy.

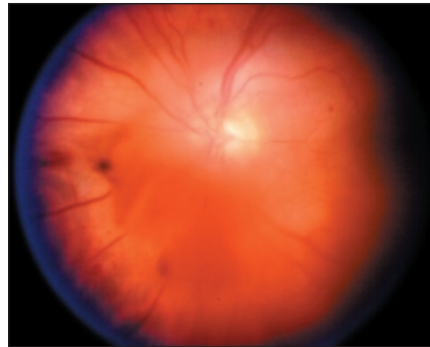


Figure 2 A vitreous haemorrhage involving the optic disc. Visual acuity was not affected in this patient.

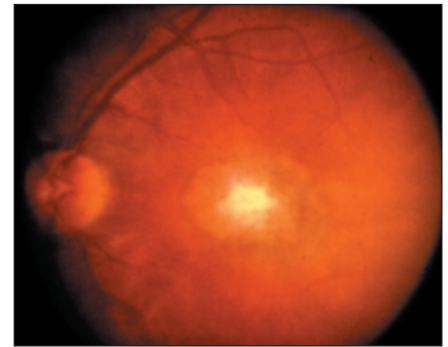
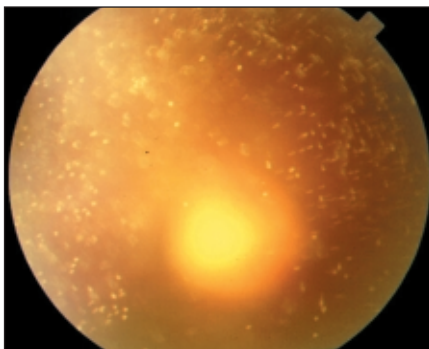


Figure 3 Active toxoplasmosis can present with a dense vitritis, demonstrating a 'headlights in the fog' appearance.



Figures 4a and 4b Densely packed asteroid bodies may obscure the posterior pole in some cases.

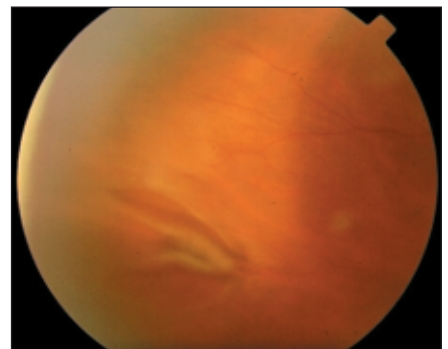
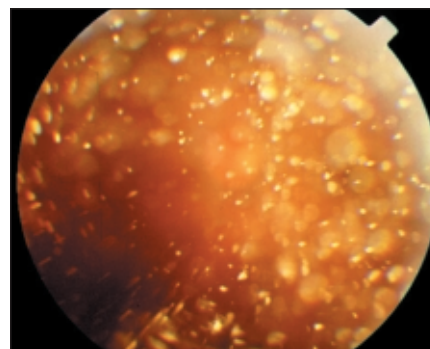


Figure 5 (retinal flap tear) Tractional retinal tears, like the one shown here, are a common cause of 'flashes'.

identifying pain, pressure, or temperature. The only stimulus that the retina acknowledges is light. So when the photoreceptors experience mechanical stimulation, they send a signal to the brain in the form of disorganized light, which is perceived by the occipital cortex as a 'flash'.

Photopsia is an ominous symptom of vitreoretinal traction, since it may indicate a tear in the retina. The presence of photopsia with a tractional retinal tear denotes that the mobile vitreous is pulling the retina away from the RPE, allowing liquefied vitreous to accumulate beneath the edges of the tear. Ultimately, this can lead to rhegmatogenous retinal detachment. The advancing detachment will further physically stimulate the retina, with additional or continued complaints of flashes.

Migraine phenomena are often described by patients as beginning with flashing lights in the peripheral visual field. This 'aura' is likely due to an ischaemic phenomenon spreading across the various regions of the brain, including the occipital cortex. The lights typically take on a herringbone pattern, surrounding an area of dim or missing vision (fortification scotoma). The scotoma increases in size as it migrates across the visual field. The aura usually lasts about 20-30 minutes, and may be associated with vertigo, tremors, weakness in the extremities, and difficulty speaking.

In the classic form of migraine, a severe headache with associated nausea ensues. Other symptoms may include extreme sensitivity to light and noise, profuse sweating and vomiting. It is possible to encounter the visual aura of migraine without the associated headache or

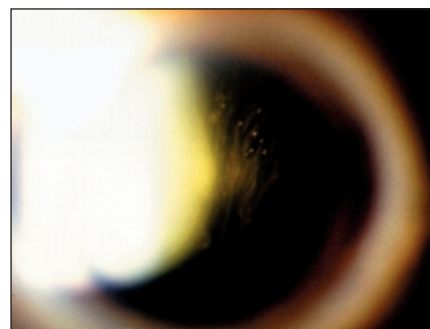


Figure 6 Pigment accumulation in the anterior vitreous, sometimes referred to as 'Shaffer's sign', often accompanies rhegmatogenous retinal detachment.

other symptoms, though in our experience this is seen less commonly.

One final clinical entity bears mention. Papillophlebitis, a central retinal vein occlusion occurring in a young adult, has anecdotally been associated with flashing lights during the active bleeding phase. The flashes have specifically been described as golden or purple lights. The aetiology of this phenomenon is unknown, but may represent a mechanical disturbance of the photoreceptors by the blood leaking from the retinal capillaries.

This phenomenon has not been reported in the literature on papillophlebitis, but we, as well as others managing patients with papillophlebitis, have frequently heard this patient complaint (Dr Andrew Gurwood, personal communication).

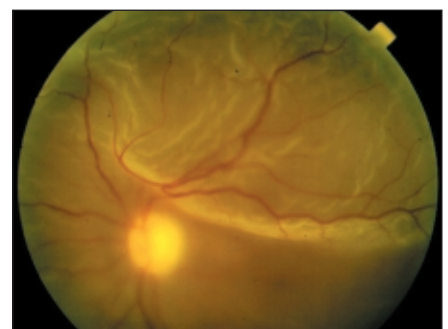


Figure 7 The patient presented with a history of flashes and a 'veil' over the inferior portion of her vision. Note the white, billowy retinal detachment superiorly.

About the authors

Drs Kabat and Sowka are faculty members at the Nova Southeastern University College of Optometry in Fort Lauderdale, Florida.

Dr Kabat is an Associate Professor and serves as an Attending Physician in the Primary Care Service, as well as Director of Externships for the College. Dr Sowka is also an Associate Professor as well as Chief of both the Primary Care Service and the Glaucoma Service. Drs Kabat and Sowka are widely published and lecture internationally on topics of ocular disease.

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