Flashes, floaters and fuzz

Flashing lights (photopsia) and floaters are common visual phenomena and patients frequently present to hospital with these symptoms. This article provides a guide for the non-specialist to the different pathologies that may result in photopsia and floaters.

Flashing lights (photopsia) and floaters are common visual phenomena and a common cause of presentation to the emergency department. They may present in many forms and can cause significant distress for patients. Although these symptoms are commonly benign, a thorough history and examination is essential to elucidate a cause and identify the small number of patients with sight-threatening, and potentially life-threatening, pathology. This article examines some of these pathologies and provides a guide for the referring doctor.

Floaters and photopsia

Floaters are vitreous opacities, which commonly move as the patient moves his/her eyes. Floaters may arise from shrinkage and liquefaction of the vitreous gel, haemorrhage or debris arising from infection or inflammation. Photopsia is an entoptic phenomenon, a perception of light arising in the absence of external light stimuli. Photopsia is often a sign of retinal or cerebral pathology but may be induced in a normal eye by mechanical stimulation of photoreceptors, for example by rubbing the eye or by looking in extreme gaze (Kanski and Bowling, 2011). Patients may describe photopsia in many ways and its character often gives clues about the cause (*Table 1*).

Vitreoretinal pathology

Posterior vitreous detachments, retinal tears and retinal detachments

Posterior vitreous detachments are the most common cause of photopsia and floaters. This process typically occurs in patients over the age of 50 years. Patients report a unilateral sudden onset of floaters, which may vary in size and appearance. Floaters arise from shrinkage and liquefaction of the vitreous gel, resulting in the formation of vitreous opacities. They may also arise as a result of vitreous haemorrhage caused by traction on retinal blood vessels. Photopsia is often described as multiple vertical streaks or temporal arcs of light. They last for a fraction of a second and are more apparent at night. They arise as a result of vitreous traction on the retina, which results in stimulation of retinal photoreceptors.

Traction on the retina caused by a symptomatic posterior vitreous detachment results in retinal tears in approximately 14% of patients (Hollands et al, 2009). Tears cannot be excluded without a dilated, indented examination of the retina and, if identified, require prompt laser treatment to prevent retinal detachments. Retinal detachments have an incidence of 12 in 100 000 (Mitry et al, 2010) and usually require surgery to reattach. Patients with retinal detachments may present with good vision if the macula is still attached, although they commonly report visual field loss. The visual prognosis following surgery varies according to the length of time that the detachment has been present and the presence of macular involvement. Surgery for a macula-on-retinal detachment has a good visual prognosis if carried out

Table 1. Differential diagnosis associated with character of flashing lights

Character of photopsia	Differential diagnosis
Temporal flashes of light	Posterior vitreous detachment
	Retinal tear
	Retinal detachment
	Infectious chorioretinopathies
Shimmering lights within scotomata	Migraine with visual aura
	Occipital lobe pathology
	Inflammatory chorioretinopathies
Generalized shimmering lights followed by transient or permanent loss of vision	Central retinal artery occlusion
	Transient ischaemic attack
	Cerebrovascular accident
	Giant cell arteritis
	Autoimmune retinopathies
Peripheral shimmering light	Idiopathic intracranial hypertension
	Retinitis pigmentosa
Flashing lights on eye movement	Normal entoptic phenomenon
	Optic neuritis
	Thyroid eye disease
'Balls of light' travelling across visual field	Choroidal melanoma
Flashing lights in pregnancy	Pre-eclampsia
	Eclampsia

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within a week of the diagnosis (Ehrlich et al, 2013). Patients with acute symptoms should be referred to the eye clinic for evaluation within 1–2 days. Those with symptoms of a longer duration require a less urgent referral (*Figure 1*).

Neurological pathology

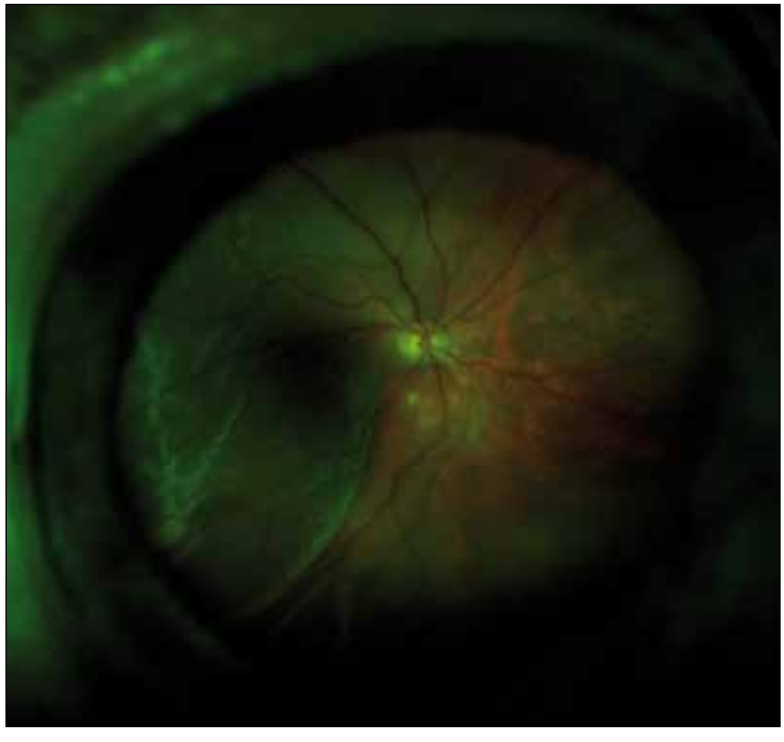
Migraine with visual aura

Migraine with visual aura is another common cause of photopsia in patients who present to the emergency department. The diagnosis is based on clinical findings and the International Headache Society classification is a commonly used tool to aid diagnosis (Headache Classification Subcommittee of the International Headache Society, 2004). Migraine with aura has a prevalence of 8%, with 72% of these patients reporting a visual aura (Gudmundsson et al, 2010).

Photopsia is typically described as a scintillating scotoma or a 'fortification spectrum' but flashing lights, metamorphopsia and transient partial or total loss of vision are also very common. The visual aura often precedes the headache and may be unilateral or bilateral. Headaches, nausea and photophobia typically follow the visual aura. A small proportion of patients may experience the visual aura without the headache and diagnosis may be more difficult in these cases, although there is often a prior history of classical migraine with visual aura.

The aetiology of migraines is not known and both vascular and neurogenic causes have been postulated. There is strong evidence for a genetic component. Treatment typically involves pain relief and tryptamine-based medication. Migraines are usually managed in the community, although atypical cases may be referred to neurology. Referral to ophthalmology is not usually required.

Figure 1. Retinal detachment.



Intracranial pathology

Very rarely photopsia and migraine-like visual aura may occur in patients with occipital lobe pathology. This includes occipital infarcts, arteriovenous malformations, occipital epilepsy and tumours (Shams and Plant, 2011). These conditions seldom present with photopsia alone and clinicians should consider imaging and referral to neurology if any atypical features are present.

Idiopathic intracranial hypertension

This is a rare condition with a predilection for young overweight females. Patients present with headaches, intermittent visual obscurations and photopsia, described as peripheral sparkles or flashes of light. Ocular examination demonstrates papilloedema and, in severe cases, reduced vision, reduced colour vision and constriction of visual fields. Patients require imaging and referral to neurology for treatment (Ball and Clarke, 2006).

Charles Bonnet syndrome

This is a very rare condition of unknown aetiology that occurs in patients with severe bilateral visual loss. Patients experience visual hallucinations, which may range from simple flashing lights to fully formed figures. Although no treatment is available, many patients worry that their symptoms indicate mental illness and an explanation of the condition often reassures them.

Vascular pathology

Central retinal artery occlusion and retinal vasospasm

Retinal hypoperfusion presents with unilateral photopsia and amaurosis fugax. Photopsia is often described as sparkling or shimmering light, occurring before loss of vision. Central retinal artery occlusions present with reduced vision, a pale retina and a 'cherry red spot' at the macula (*Figure 2*). Treatment with ocular massage and intraocular pressure-lowering agents is controversial but may reverse visual loss if performed early, so these patients require an urgent referral to ophthalmology. However, the visual prognosis in the majority of patients remains poor. Transient central retinal artery occlusions or retinal vasospasm may result in transient loss of vision with a normal fundus examination. These patients should also be referred urgently to ophthalmology. Patients with suspected transient or permanent retinal artery occlusions are usually managed jointly with the stroke unit.

Cerebrovascular pathology

Cerebrovascular accidents and transient ischaemic attacks may present with photopsia, amaurosis fugax and tran-

sient or permanent loss of vision, in the presence of a normal fundal examination. Patients require urgent referral to a stroke unit.

Giant cell arteritis may also present with photopsia and amaurosis fugax, although a gradual loss of vision over days or weeks is more common. It is characteristically associated with scalp tenderness, jaw claudication and temporal headaches. Fundus examination may be normal or may demonstrate optic disc swelling or optic disc pallor. Giant cell arteritis is associated with raised inflammatory markers and requires immediate steroid treatment to prevent further visual loss, followed by an urgent referral to rheumatology (Dasgupta and the Giant Cell Arteritits Guideline Development Group, 2010).

Pre-eclampsia and eclampsia

Clinicians examining pregnant patients who present with visual loss, photopsia or any other visual disturbances should consider a diagnosis of pre-eclampsia and eclampsia. Visual changes occurring in pre-eclampsia and eclampsia are usually reversible when the condition is treated but severe disease may result in permanent visual loss. These patients require an urgent referral to obstetrics (Roos et al, 2012).

Optic neuropathies

Optic neuritis typically presents with visual loss, loss of colour vision, relative afferent pupillary defect and pain on eye movements. Up to 30% of patients also report photopsia on eye movement (Beck, 1988). These patients require referral to neurology.

Photopsia on upgaze has also been reported in thyroid eye disease. It is thought to be caused by the inflamed enlarged inferior rectus muscle leading to retinal compression and stimulation of photoreceptors (Danks and Harrad, 1998). Patients require immunosuppression and are managed jointly by ophthalmologists and physicians.

Other retinal pathology

A number of rare retinal conditions may present with photopsia and floaters. The list below is not exhaustive but illustrates the range of conditions that may present with these symptoms. Patients with these conditions should be referred to ophthalmology for evaluation.

Infectious chorioretinopathies

Infectious chorioretinitis may be caused by a variety of viral, bacterial and parasitic agents. Identification of the underlying disease is key to managing the condition and preventing visual loss. An extremely rare but visually devastating example is acute retinal necrosis, a condition arising from viral retinitis (*Figure 3*). It is commonly caused by varicella zoster virus or herpes simplex virus and may occur in healthy individuals (Cochrane et al, 2012). Fundal examination demonstrates peripheral necrotizing retinitis and vitritis, and there is a high incidence of retinal detachments.

Inflammatory retinopathies

Inflammatory retinopathies are a spectrum of diseases of unknown aetiology that fall under the umbrella of 'white dot' syndromes, because of the presence of multiple yellow-white chorioretinal lesions. Floaters may occur in these syndromes if vitritis is present (Abu-Yaghi et al, 2011). Photopsia is most frequent in acute zonal occult outer retinopathy and is described as flickering lights and shimmering vision within a scotoma (Gass et al, 2002). The visual prognosis varies and treatment for the majority of these conditions is systemic immunosuppression.

Autoimmune retinopathies

Autoimmune retinopathies include cancer-associated retinopathy, primarily associated with small cell lung cancer, and melanoma-associated retinopathy. They occur as a result of autoantibodies against retinal compo-

Figure 2. Central retinal artery occlusion.

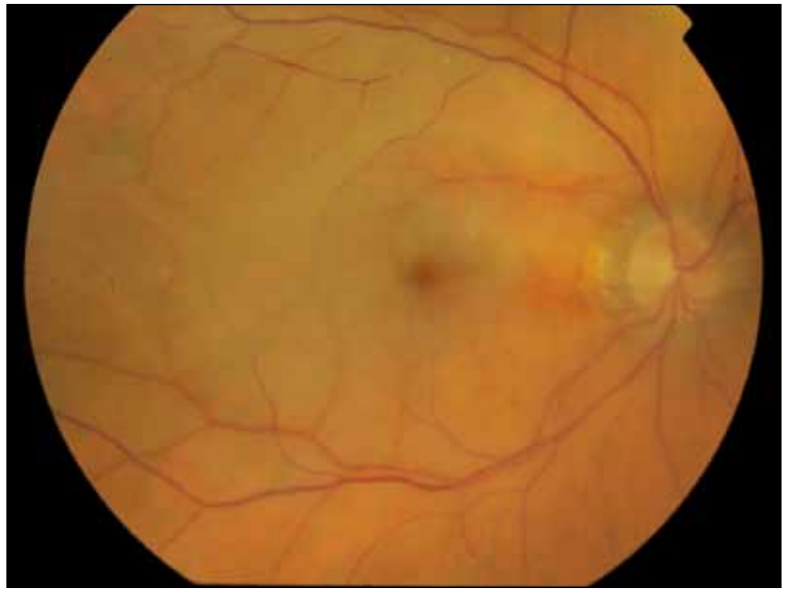
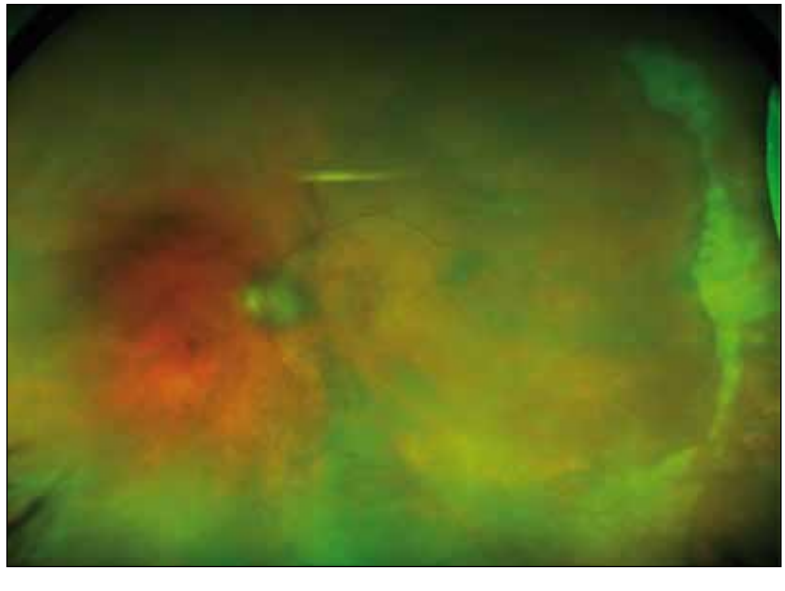


Figure 3. Acute retinal necrosis.



nents. Patients present with bilateral painless visual loss associated with shimmering or flickering lights and smoky or swirling vision. Treatment is usually ineffective (Braithwaite et al, 2012).

Retinitis pigmentosa

These inherited retinopathies result in progressive loss of photoreceptor function. Patients typically present within the first two decades of life with poor night vision. They develop progressive constriction of their visual fields and eventual loss of vision. Photopsia in the form of peripheral shimmering lights may be described. Fundoscopy demonstrates arteriolar narrowing, mid peripheral 'bone spicule' pigmentary changes and a waxy optic disc pallor.

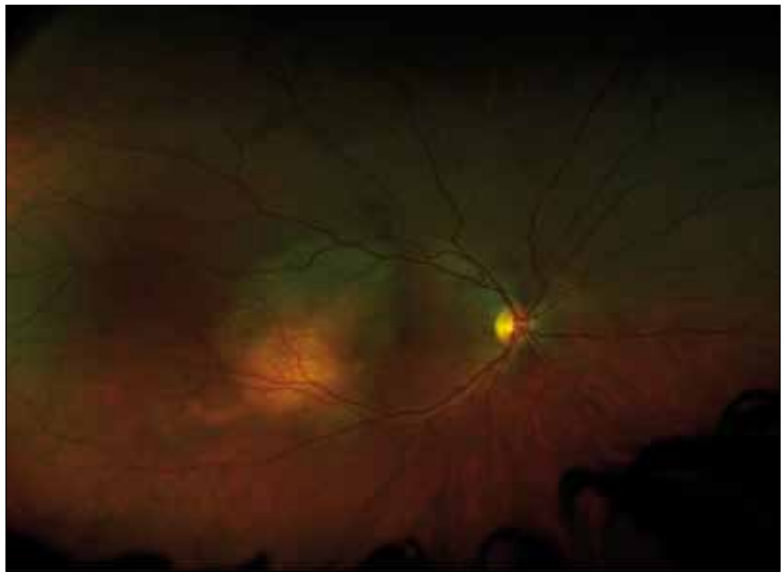
Ocular neoplasia

Choroidal melanoma is a rare tumour, typically affecting individuals in their fifth and sixth decades. Patients may present with unilateral photopsia, floaters and visual field loss. Photopsia is commonly described as a 'ball of light' travelling across the visual field, which is most apparent at night. Floaters may occur as a result of vitreous haemorrhage or vitritis. Fundoscopy demonstrates a raised subretinal dome-shaped mass, which may be associated with exudative retinal detachments, haemorrhage and uveitis. Referral to a specialist ocular oncologist is required. Radiotherapy is commonly used to treat medium-sized tumours and enucleation to treat large tumours. Despite treatment the mortality is high. The Collaborative Ocular Melanoma Study Group (2001) described a 43% 5-year mortality rate from metastases in patients with large tumours after enucleation.

Choroidal metastases may also cause photopsia, floaters and visual impairment. The most frequent primary site is breast in women and lung in men. Fundoscopy demonstrates fast-growing white placoid lesions, which are frequently bilateral and multifocal (*Figure 4*). Systemic chemotherapy to treat the primary tumour is first-line therapy, although radiotherapy and surgery may also be considered if symptomatic.

Choroidal haemangiomas may also present with visual impairment, metamorphopsia and photopsia. Fundoscopy demonstrates a red-orange oval mass with indistinct margins, typically in the peripapillary region. Photodynamic therapy or radiotherapy may be used to treat symptomatic lesions.

Figure 4. Choroidal metastasis.



Other rare causes

A number of drugs have been reported to cause photopsia including voriconazole (Kadikoy et al, 2010), digitalis (Oishi et al, 2006) and quetiapine (Hazra et al, 2006).

Conclusions

Posterior vitreous detachments, retinal tears and migraines with visual aura are the three most common causes of photopsia and floaters. These conditions will account for the majority of patients with photopsia and floaters who are examined by a non-specialist. However, it is important to remember that a wide range of pathologies may cause these symptoms. Although ophthalmology input is often required, doctors should also consider neurological and systemic causes, in order to organize appropriate investigations and referrals. Ocular conditions often require a multidisciplinary approach and multiple specialties may be involved in the care of patients with complex diseases. BJHM

KEY POINTS

- Photopsia and floaters are common visual phenomena and a number of pathologies may present with these symptoms.
- Posterior vitreous detachments, retinal tears and migraine with visual aura are the three most common causes of these symptoms.
- Although photopsia and floaters are commonly benign, it is important to recognize the small proportion of patients who may present with sight-threatening or life-threatening pathology.
- Ophthalmology input is frequently required but other specialist input should be considered if the history and examination indicate neurological or systemic pathology.

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