Posterior Vitreous Detachment

**Synonyms:** vitreous detachment, vitreous separation

Posterior vitreous detachment (PVD) is the separation of the posterior hyaloid face of the vitreous body from the neurosensory retina. The importance of PVD is that it is common but its symptoms and signs may mimic those of a retinal detachment.

**Epidemiology**

- PVD is the most common cause of flashes and floaters.
- Some older studies suggest a prevalence in high myopes of over 70% by age 65[^1].
- Studies suggest that PVD is present in fewer than 10% of people younger than 50 years but is present in at least one eye in 27% of individuals aged 60 to 69 and in more than 60% of subjects aged 70 and older[^2].

**Risk factors**

- The most important risk factors for PVD are increasing age and myopia.
- Other predisposing factors include:
  - A family history of retinal tears or detachments.
  - Intraocular inflammation (uveitis).
  - Trauma.
  - Previous eye surgery.
- Patients are at greatest risk for a symptomatic PVD in the 5th to 7th decade of life, although it can occur much earlier. Most often patients are myopic (near-sighted).

**Aetiology**

At birth, the vitreous gel fills the back of the eye and normally has jelly-like consistency. With age, the vitreous becomes more fluid (syneresis). Pockets of fluid in the vitreous cavity may give the patient a sensation of 'floaters' or 'cobwebs'.

As the pockets collapse on themselves, they pull on the retina giving a sensation of flashes of light (photopsias.) Eventually, the vitreous may completely separate from the neurosensory retina. This usually occurs in one eye at a time; however, a PVD in the contralateral eye often occurs 6-24 months later[^3].

As the vitreous separates, it may cause a tear in the fragile neurosensory retina. A retinal tear may allow liquid vitreous to track behind the retina, causing detachment. This is known as a rhegmatogenous retinal detachment (RRD). Typically, however, the vitreous separates without any ill effects on the retina.

- An acute PVD is most commonly caused by this natural process of vitreous shrinkage and liquefaction over time.
- In cases of ocular or head trauma, a 'traumatic PVD' may occur.
Nature of the vitreous

- The vitreous makes up about 80% of ocular volume. It consists mostly of water (99%), the remainder being hyaluronic acid and collagen fibrils. These fibrils connect the vitreous to the retina. Some areas (at the disc, the fovea and around the periphery anteriorly) are more adherent to the retina than others.
- The concentration of hyaluronic acid decreases with age, and the vitreous liquefies (a process called synchysis). It reduces in volume, causing it to shrink away from the retina and, in doing so, to detach. In the process it may pull on the retina (particularly if a more adherent area has become detached) and a retinal tear may result. If fluid seeps under a retinal tear, retinal detachment ensues.
- In high myopia, PVD develops increasingly both with age and with the degree of myopia[1].

Types of PVD

- Acute PVD usually develops suddenly, becoming complete within weeks of onset of symptoms.
- A PVD is considered ‘partial’ when the vitreous jelly is still attached at the macula/optic nerve head and ‘complete’ once total separation of the jelly from the optic nerve head has occurred.
- Incomplete PVD is sometimes seen with a slit lamp and is differentiated into type 1 (shallow PVD with circular perifoveal vitreous attachment), type 2 (PVD reaching the fovea but not foveola), type 3 (shallow PVD with pinpoint vitreous attachment at the foveola) and type 4 (PVD completely detached from the macula but attached to the optic disc)[2].

Presentation

Age-related PVD evolves over a prolonged period, probably years. Although it is usually asymptomatic, it can lead to a variety of problems, depending on the size and strength of the remaining vitreoretinal adhesion[4].

Symptoms

- There may be none.
- Single (usually) or multiple floaters (dots, spots, or wispy ‘lace’ objects). The floaters are often described as circular, ovoid or a curvilinear, depending on the completeness of the detachment. They may be a nuisance to the patient.
- A shower of black specks (often described as gnats or like pepper) is more of greater concern. Often these new floaters are 'too many to count'. This may indicate pigment released from the retina and surrounding structures, or red blood cells from a broken retinal vessel. They may indicate vitreous haemorrhage or increased risk of retinal tear or detachment.
- Photopsia (an ocular flash) occurs if the separation exerts traction on the retina. The flashes are often described as a camera flash going off repeatedly in the patient's peripheral vision. The photopsias tend to be more noticeable in dimly lit environments.
- PVD is painless.

Signs

Unless there is a large associated retinal detachment, signs are only likely to be elicited on slit-lamp biomicroscopy. Findings may include:

- A Weiss ring: this is the condensed, thickened posterior surface of the vitreous that has become visible as it has pulled away from the optic disc. It looks like a thin irregular ring of translucent material floating in the vitreous.
- Occasionally, an associated vitreous haemorrhage is seen.

Investigations

See also separate Flashes, Floaters and Haloes article.

Most floaters in patients aged over 50 are due to benign vitreous liquefaction. However, a full slit-lamp examination is mandatory to rule out retinal breaks or tears. If a haemorrhage is noted, an ultrasound scan is performed to assess it (the probe is placed on the closed eyelid of the patient). If there is a tear or detachment, a visual field may be done to ascertain the extent of visual loss.

Management[5]

Refer urgently (same day) to eye casualty, to evaluate the central and peripheral retina in order to exclude retinal tears or holes, which can proceed to retinal detachment.

- Patients with uncomplicated asymptomatic PVD usually need no treatment.
- 10% of patients presenting with PVD have a retinal tear (half of these have multiple tears).
- A retinal tear can be sealed in the early stages by laser therapy, thus preventing liquid vitreous seeping through the hole and causing a retinal detachment.
- Highly symptomatic patients should ideally be followed up 4-6 weeks following presentation. High-risk patients (previous detachments, high myopes, recent surgery or trauma) are generally reviewed but others may not be. For most, however, retinal detachment advice is given and the patient is discharged.
- Patients with haemorrhages need following up. Retinal detachment advice.

Patients should seek medical help if:

- There are further episodes of new floaters (particularly a shower of black specks).
• There are new episodes of flashes or the flashes worsen (particularly if visible in broad daylight).
• There is any deterioration of vision.

Complications[5,6]

• **Haemorrhagic PVD** (ie PVD with associated vitreous haemorrhage) occurs in about 7.5%. The blood in the vitreous cavity can make vision quite poor and patients may describe red floaters. It occurs when a retinal blood vessel is torn during vitreous separation. The risk of an underlying retinal tear increases to nearly 70% in haemorrhagic PVD. Symptoms may include a significant decrease in vision. While the blood will clear slowly over time, this raises a high index of suspicion for a retinal tear or detachment. Ultrasonography may be necessary to assess for retinal tears and detachments if the vitreous haemorrhage obscures the examiner’s view.

• **Retinal tear** (defined as a full-thickness break in the retina) is present in about 10% of cases on presentation and a further 2-5% of patients in the weeks that follow. For this reason, it is important to have a dilated scleral depressed examination. These tears are horseshoe-shaped, like a flap of torn tissue:
  - A retinal tear is not serious in itself but if the liquefied vitreous escapes through the tear and behind the retina, it can result in a neurosensory retinal detachment. Laser demarcation can prevent progression.
  - If a retinal tear does occur during a PVD, it usually happens at the same time as one begins to experience symptoms of the PVD. Therefore, it is important to be examined shortly after these symptoms begin.

• **Retinal detachment**: precursors are PVD, asymptomatic retinal breaks, symptomatic retinal breaks, lattice degeneration and cystic and zonular traction. Nearly all patients with a symptomatic clinical RRD will progressively lose vision unless the detachment is repaired:
  - Asymptomatic new retinal breaks lead to detachment in about 5% of cases.
  - Symptomatic new retinal breaks progress to detachment in 50% of cases.

• High myopes (ie refraction of -6.00 or greater) are at increased risk of complications from a PVD, due to thinning of the retina as it is stretched along a longer eye.

Prognosis[5]

Most patients become symptom-free over a few months and learn to tolerate the floaters quite quickly. The vitreous will not reattach but the associated symptoms subside and there are no complications.

• Most patients gradually become accustomed to the floaters and only notice them if they look at a very bright background and attempt to focus on them. This can take months.
• Flashes tend to resolve gradually as the vitreous stops tugging on the retina. Very occasionally, flashes persist that are so troublesome that surgery (vitreectomy) is considered.
• Very large vitreous haemorrhages may take a very long time to clear and may require surgical intervention.
• Late complications are common in those with retinal tears: between 5% and 14% will develop additional breaks during long-term follow-up.

Follow-up[5]

• Repeat dilated fundus examination within 4-6 weeks for an uncomplicated, non-haemorrhagic PVD - sooner as needed.
• Complicated PVD will need longer-term follow-up.

Further reading & references

• Posterior Vitreous Detachment; Good Hope Eye Clinic

5. AAO Retina/Vitreous PPP Panel, Hoskins Center for Quality Eye Care: Posterior Vitreous Detachment, Retinal Breaks, and Lattice Degeneration PPP - October 2014

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