The black veil: **Caring for patients**

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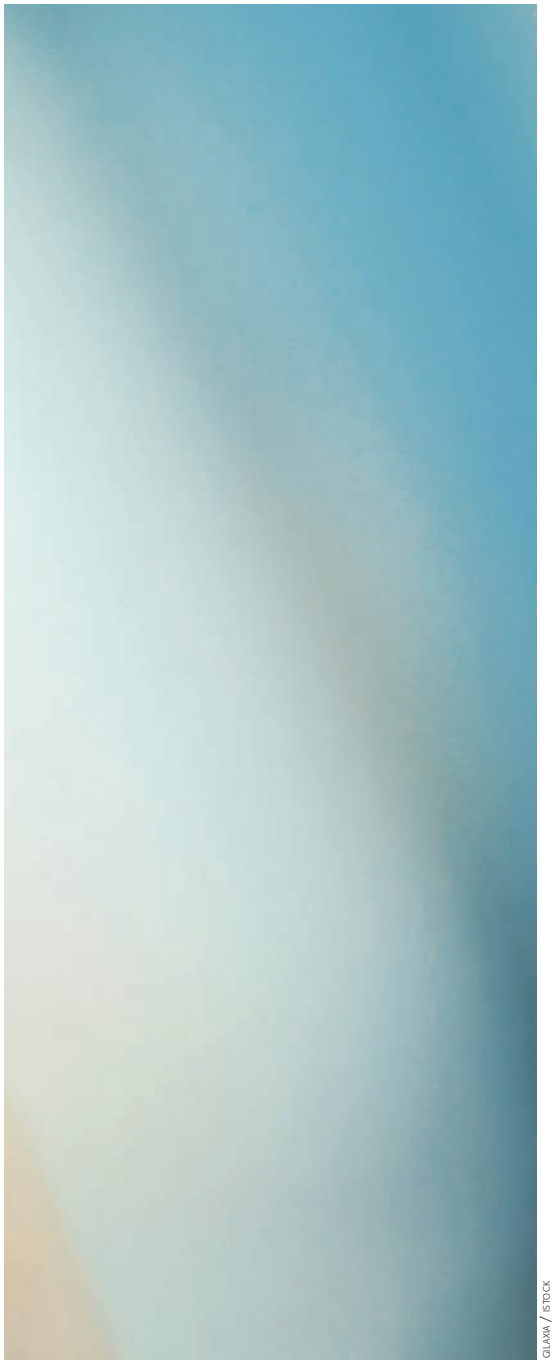
with retinal detachments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BY GAYLA H. LOVE, PhD, MSN, RN, CMSRN, CNEcl

Abstract: Retinal detachments are a rare but serious event, and nurses have an important role in helping maintain optimal outcomes for these patients. This article addresses the causes and treatments for a detached retina.

Keywords: Detached retina, pars plana vitrectomy, pneumatic retinopexy, retina, retinal detachment, retinal hole, retinal tear, scleral buckle

RETINAL DETACHMENTS occur when the inner layer of the retina separates from the underlying retinal pigment epithelium, the pigmented cell layer that provides the retina with nourishment.[1] These are somewhat rare in the US, occurring in approximately 1 in 15,000 individuals, and they are characterized by the sudden onset of a dark shadow or black veil coming from above, below, or either side of the visual field.[2] Although retinal detachments can occur at any age, they are more common in those age 40 and older. If left untreated, the entire retina may detach and vision will be permanently lost.[1]

As nurses work with patients for optimal outcomes and quality of life, they need a clear understanding of the pathophysiology and treatment plan for retinal detachments. This article offers an overview of the diagnosis, management, and possible complications of retinal detachments, illustrated with a case study.

Anatomy and physiology

The eye is made up of three layers (see *Internal anatomy of the eye*). The innermost posterior layer, or the retina, is a thin structure that initiates the transmission of impulses to the optic nerve.[1,3] The middle layer, or uvea, consists of the following:[3,4]

- the choroid, which has many blood vessels and provides oxygen and nutrition to both the peripheral retina and the macula
- the ciliary body, which connects the choroid to the iris and secretes aqueous humor
- the iris, which is the colored portion of the eye; the opening is the pupil. The muscles of the iris relax and contract, controlling pupil size and the amount of light entering the eye.

The external layer, or sclera, is an opaque, fibrous, protective outer layer that is directly connected to both the cornea anteriorly and the sheath covering the optic nerve posteriorly.[3]

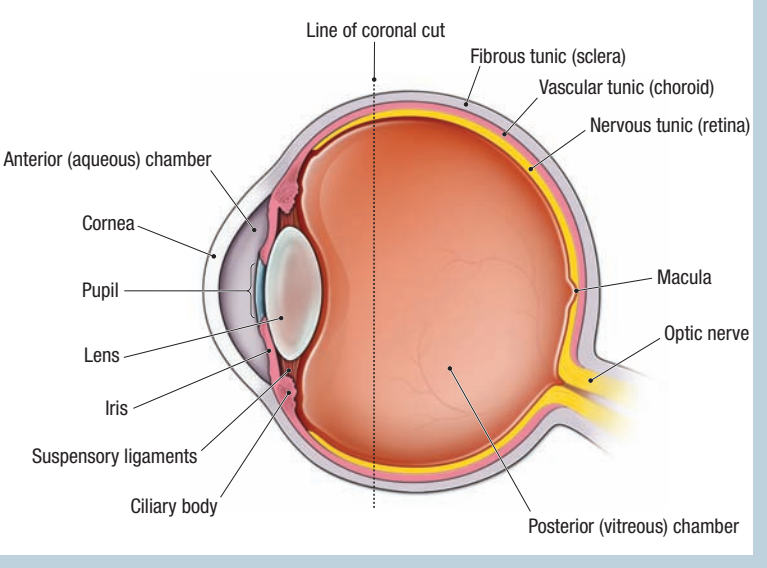
The optic nerve, cranial nerve II, communicates with the brain as a sensory organ for vision, similar to a camera.[3] The retina is a nerve layer that senses light and sends images to the brain. The cornea, pupil, and lens are located in the anterior segment and allow light to pass through.[1,3,5] On its way, the light passes through the aqueous humor, which is a watery fluid that fills the eyeball anterior to the lens, and a jelly-like substance in the center of the eye called the vitreous.[1,3]

The retina is a thin layer of tissue covering the inner surface of the posterior two-thirds to three-quarters of the eye.[6] The retina communicates images to the brain as light reaches it. Similar to a bullseye, it has two areas, the peripheral retina and the macula.[7]

The *peripheral retina* surrounds the macula and is responsible for peripheral and night vision.[3,8] It also allows individuals to recognize general shapes. The *macula* is very sensitive and provides fine details. It allows individuals to perform many everyday activities, such as reading, recognizing faces, threading needles, seeing street signs, and driving cars.[3,4]

Internal anatomy of the eye

The retina covers two-thirds to three-quarters of the inner surface of the posterior chamber.



Source: Detton AJ. *Grant's Dissector*. 16th ed. Philadelphia, PA: Wolters Kluwer; 2017.

Pathophysiology

Patients may be diagnosed with retinal holes, tears, or detachments. *Retinal holes* are small defects that develop in the center of the macula. They are often caused by abnormal traction between the retina and the vitreous or an injury to the eye.[7] When a hole occurs, patients may notice a slight distortion or reduction in vision that progresses as the hole becomes larger.[7] When a patient develops a retinal hole in one eye, there is a 5% to 10% risk for the development of a retinal hole in the other eye.[7]

Retinal tears occur when the vitreous shrinks and exerts enough pressure on the retina to cause a break in the tissue.[1,8] If a tear involves a retinal blood vessel, blood may enter the vitreous (vitreous hemorrhage).[1,8] A *retinal detachment* occurs when fluid under the retina lifts it away from the underlying tissue (see *Detached retina*).

The most serious retinal problems are caused by changes in the vitreous, which fills the entire space posterior to the lens, maintains the shape of the eyeball, and aids in refraction.[4] The vitreous is a semisolid mass that degenerates and liquifies with aging, becoming more fibrous.[9] As it liquefies, the vitreous becomes condensed, stringy, and forms strands.[10]

A *posterior vitreous detachment (PVD)* occurs in both eyes for many individuals, but it rarely causes problems. A PVD is caused by excessive movement of the liquefied vitreous, which pulls on the retina and optic nerve in the posterior segment of the eye. Typically, it only causes floaters, which are spots, circles, or irregular fine threads in an individual's vision.[2,4]

Retinal detachment types

There are two types of retinal detachments:[11]

- rhegmatogenous detachments
- nonrhegmatogenous detachments, which include tractional and exudative detachments.[2]

Rhegmatogenous detachments occur in the posterior vitreous and are the most common type.[11] These are typically caused by aging and occur when the vitreous gets into the retina through a tear and separates it from the retinal pigment epithelium.[1,2,10] *Tractional* detachments are typically seen in patients with diabetic retinopathy and occur when scar tissue grows on the retina surface, causing the retina to pull away from the back of the eye.[1,2,10,11] *Exudative* detachments are commonly caused by age-related macular degeneration, a tumor, a blunt injury to the eye, or inflammatory disorders such as lupus. These are characterized by fluid accumulating beneath the retina with no associated holes or tears.[1,2,10]

Risk factors

Risk factors for retinal detachment include PVD, myopia, focal thinning of the periphery of the retina called lattice degeneration, and a family or personal history of retina tears or detachments.[11] Additional risk factors include previous cataract surgery, glaucoma, advanced age, diabetic retinopathy, and ocular trauma.[2,4]

Clinical manifestations

Although the vitreous pulls away from the retina over time, patients may or may not exhibit any visual problems.[8] Patients who present with symptoms, however, may experience blurred and distorted images complicated by photopsia, or flashes of light, and floaters.[2,4]

When the retina tears across a blood vessel, causing a vitreous hemorrhage, a small amount of blood may cause blurred vision.[8,10] If a larger vessel is torn, more blood enters the vitreous and causes patients to see swirling red lines often described as spider webs.[3]

Photopsia is common initially and caused by the vitreous pulling on points in which it is attached to the retina.[1,2] Floaters, which are typically dark in color and more noticeable under certain lighting conditions, diminish over time. Some individuals may see a single floater while others see hundreds of various thicknesses.[8,10] No two individuals have identical patterns of floaters, which are different even between eyes, and the patterns may change over time.[2,4] These symptoms are not painful.[1]

Patients should be educated to report any new or unusual symptoms to an eye care provider for evaluation. Other disorders, such as migraines or stroke, may also cause photophobia and phonophobia.[12] However, visual defects, such as a gray or dark curtain moving across the patient's field of vision, may signify a retinal detachment and require immediate attention as a medical emergency.[2,10]

Diagnosis

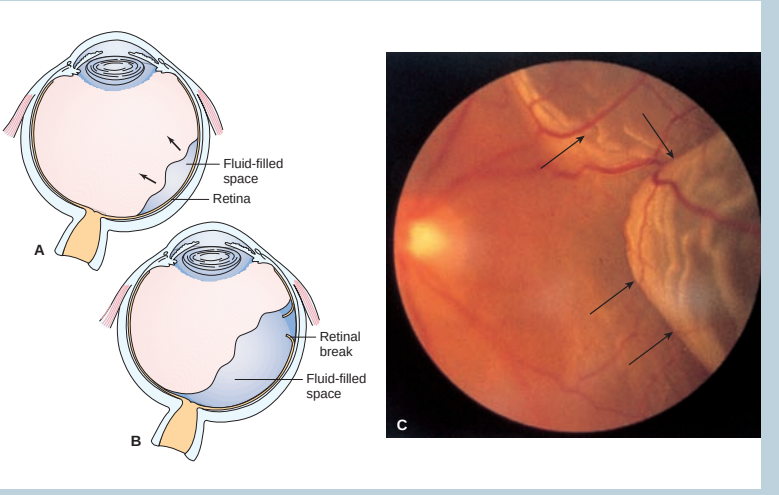
Obtain a thorough health history, including onset and duration of visual symptoms and vision loss, and risk factors such as family history, prior retinal detachments, diabetes mellitus, ocular trauma, cataract surgery, and age over 40.[1] Ask the following questions to obtain information:

- Which eye is affected (or both)?
- Describe your symptoms.
- When did your symptoms start?
- Did your symptoms begin suddenly, or did they develop over time?
- What were you doing before the symptoms occurred?
- Describe your vision now.
- Do you have any eye pain or pressure?

Retinal holes, tears, and detachments are diagnosed with a thorough eye exam. Nurses should assess the general appearance of the eyes, signs of ocular trauma, and the pupillary reaction to light. Assess the patient's visual acuity and perform a confrontational evaluation of the patient's visual field before the comprehensive eye exam.[1] Instill an anesthetic and dilating solution into each eye as prescribed before intraocular pressure

Detached Retina

A detached retina occurs when the retina is separated from the underlying tissue.



Source: Hannon RA, Porth CM. *Porth Pathophysiology: Concepts of Altered States.* 2nd ed. Philadelphia, PA: Wolters Kluwer; 2017.

(IOP) measurements and slit-lamp biomicroscopy, which combines a low-power microscope with a light source.[1]

IOP can be measured with a tonometer, which applies pressure to the outside of the eye until it equals the pressure inside the eye. Noncontact tonometry, also called the air puff test, is another method to assess IOP. This is performed using a gentle puff of air to flatten the cornea.[1,2] Although it is not considered as accurate as the tonometer, it provides a quick method to assess IOP.[13]

Normal IOP ranges between 10 mm Hg and 21 mm Hg, but this may be higher or lower secondary to various comorbidities.[2,5,13] Due to increased outflow of fluid through the exposed retinal pigment epithelium, IOP is typically low in patients with retinal detachments.[2]

Eye care providers complete a thorough exam of the dilated fundus with ophthalmoscopy. Retinal exams allow eye care providers to see any holes, tears, and detachments. If a hemorrhage is present, an ultrasound may provide a better view of the retina and reveal the specific area of bleeding.[8,10]

Management

Retinal holes may resolve without intervention, but this is usually not recommended due to the risk of permanent vision loss.[7] They are most often treated with a vitrectomy, a surgical procedure in which the retinal specialist removes the vitreous gel to stop it from pulling on the retina and replaces it with intravitreal air, silicone oil, or a gas bubble.[7,11]

Retinal tears are treated by sealing the retina to the posterior wall using photocoagulation or cryopexy.[14] *Photocoagulation* uses a laser to make small burns around the retinal tear.[14] *Cryopexy* uses a special freezing probe to apply intense cold around the tear.[14] In both procedures, the resulting scar tissue seals the retina to prevent a retinal detachment.[14]

Three surgical procedures are typically used to treat retinal detachments:

- scleral buckle
- pars plana vitrectomy
- pneumatic retinopexy.

Recovery from surgical procedures for retinal holes, tears, and detachments may require patients to lie in a face-down position post-op.[8,14,15] These positions may necessitate a positioning chair or a horseshoe-shaped pillow to support the forehead and provide an opening for the face.[14]

The eye care provider determines the postoperative positioning requirements depending on the injury, procedure, and possible complications. This may change as patients progress. Following surgery, face-down positioning may be required for 12 to 22 hours a day from anywhere between 3 weeks and 3 months.[10] Patients are instructed to remain in position, with the exceptions of using the bathroom or eating meals, and encouraged to maintain these restrictions to facilitate healing.[13]

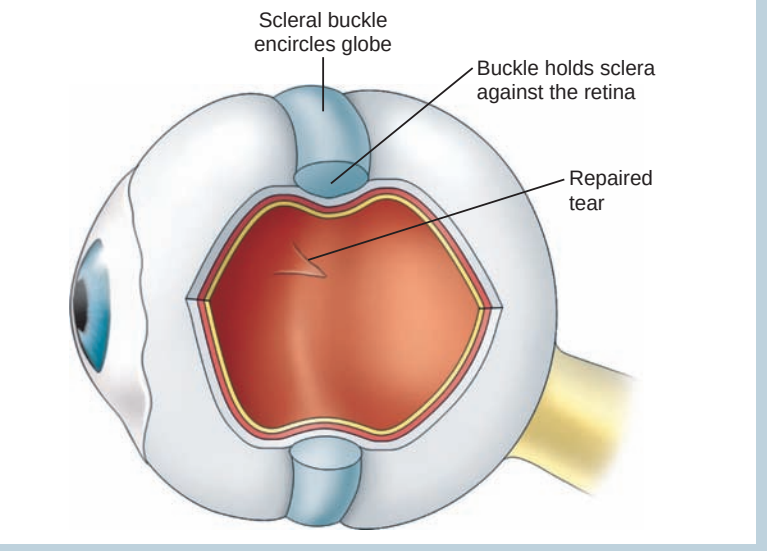
Retina specialists determine the best surgery and anesthesia based on individual retinal detachments.[2] Surgeries are outpatient procedures, and patients are discharged home the same day. Good vision following the procedure depends on many factors.

Scleral buckle is the traditional surgery for retinal detachment (see *Scleral buckle*).[8] The procedure can be performed under either local or general anesthesia. Silicone plastic or a sponge is sutured to the outside of the sclera, and the sclera is pushed in by a silicone scleral buckle. The buckle is covered by the conjunctiva and may be left on the eye permanently.[8] The surgeon may place a gas bubble into the vitreous cavity.[15] This procedure has a success rate of 80% or higher.[8]

Pars plana vitrectomy involves surgically removing the vitreous gel and replacing it with a gas bubble or

Scleral buckle

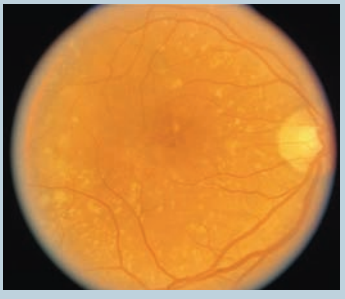
This common surgical procedure uses a sponge or silicone plastic to treat patients with a detached retina.



Source: Timby BK, Smith NE. *Introductory Medical-Surgical Nursing.* 12th ed. Philadelphia, PA: Wolters Kluwer; 2018.

Pars plana vitrectomy

Pars plana vitrectomy is a common surgical procedure that uses a gas bubble or silicon oil to treat patients with a detached retina.



Source: Hinkle JL, Cheever KH. *Brunner & Suddarth's Textbook of Medical-Surgical Nursing.* 14th ed. Philadelphia, PA: Wolters Kluwer; 2018.

silicone oil (see *Pars plana vitrectomy*). If instilled, gas bubbles typically remain for approximately 8 weeks until they are gradually absorbed and replaced with the body's own fluid.[8] If silicone oil is used, patients will require a second surgery to remove it because it does not absorb.[8]

In *pneumatic retinopexy*, surgeons inject a gas bubble into the vitreous cavity with a fine needle and position the patient so the bubble closes the retinal break.[15] Additionally, the surgeon uses a chorioretinal adhesion around all retinal breaks with cryopexy, laser, or both.[8]

Case study

DL, 67, is a male tractor trailer driver. Within 6 hours of leaving his home, DL experienced what he described as resembling a shade that blocked 75% of his vision in his left eye. He was subsequently diagnosed with a total retinal detachment.

DL's medical history was significant for hypertension, type 2 diabetes mellitus, prostate cancer, and a previous cataract removal from the left eye. He had experienced no recent eye trauma or illness prior to the event. After a thorough eye exam by an ophthalmologist, including pupil dilation, he was immediately directed to a retina specialist in the same building. His right eye was normal except for a small cataract. Without emergency surgery to his left eye, however, he could permanently lose his vision due to a detached retina.

The retina specialist performed a pars plana vitrectomy with membrane dissection and a scleral buckle. After the outpatient procedure, DL was prescribed eye drops with tapered doses for 6 weeks post-op. The eye drops were a combination solution, which included the antibiotic gatifloxacin, atropine for cycloplegic refraction; and prednisolone as an anti-inflammatory.[13,16] He was discharged with the following restrictions:

- use of an eye shield at night for the first week post-op
- no lifting of anything heavier than 15 lb (6.8 kg) for at least 3 months
- no physical exercise for 3 months
- no air travel or elevations higher than 1,000 ft for 6 months, due to the potential for higher altitudes to move the bubble and create complications
- no elevators over 10 floors for 3 months
- no rubbing or touching the affected eye for 3 months
- no showers for a week, but baths were safe.

DL was told he could return to work after 3 months, but patients in other occupations that do not involve operating heavy machinery or a quick response time in their duties may return to work within 2 weeks of surgery.

DL attended weekly follow-up visits, which included thorough eye exams and evaluations of the gas bubble that had been placed during the procedure. He was examined by a general ophthalmologist at approximately 4 months post-op, and his vision had corrected to 20/25. By his final post-op visit with the retina specialist, the gas bubble had completely resolved. He was given no further restrictions with a follow-up appointment in 6 months.

Pre- and post-op nursing considerations

According to facility policy, pre-op preparations may include no solid foods or fluids before surgery, including candy, gum, and chewing tobacco. Patients should describe any signs and symptoms or major stresses, and provide a current list of medications. It is important to ascertain if patients have had any recent life events that prevent them from lying flat or may cause other positioning problems. A history of hearing loss, confusion, dementia, or cardiovascular issues may affect patients' ability to follow instructions.

Patients should be told to avoid any pressure to the eye area and limit activity until instructed otherwise. A family member or friend should drive patients to and from the procedure and offer support as needed. Patients must be informed that it may be months before their best vision returns after surgery.

Nurses should provide discharge instructions, which include:[2]

- an up-to-date prescription for lenses from the patient's most recent eye exam
- adequate lighting for reading and other activities at home
- no area throw rugs or other fall risks
- motion activated lights.

Additionally, patients will be prescribed eye drops following surgery to use for several weeks post-op, and nurses will instruct both patients and caregivers on instilling eye drops using aseptic technique.[16] Nurses should also instruct patients on nutrition to support eye health, including a diet rich in vitamin A, beta carotene, and lutein. Five to 10 daily

servings of foods rich in fruit and red, orange, and dark green vegetables are recommended.[17]

Patients should be encouraged to involve family and friends for support, and nurses should advise patients on the available transportation options, including vans, shuttles, volunteer driving networks, and ride shares.[10] Digital talking books and computer screens may help with reading, and patients should also be encouraged to seek out support groups for those recovering from retinal detachments.[10]

Early intervention preserves vision

Retinal detachment is a time-sensitive and critical medical emergency that must be diagnosed and treated to prevent permanent loss of vision. After an evaluation of both eyes by a retina specialist, surgical interventions can be determined. DL reached out immediately after losing his vision, and his nurse recognized the symptoms and arranged for an evaluation. The nursing staff's prompt assessment and their role in pre- and post-op patient education is critical in achieving the best outcomes. ■

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