

# Macular Hole

Unlike a camera, the image obtained by the retina is not of uniform clarity or sharpness. Only the central portion of the retina, the macula, is sensitive enough to provide high quality vision for tasks such as reading, watching television, or driving. The macula is a very small area, with the central portion being only about the size of the head of a pin. It is only this specialized area of the retina, the macula, that is capable of the detailed vision necessary for many daily tasks.

In order to maintain its round structure, the central portion of the eye is filled with a jelly-like substance known as the vitreous. At birth and through early years, the vitreous has a fairly solid structure, having a consistency somewhat between Jell-O and molasses. As a person ages, however, the vitreous jell begins to shrink and becomes more condensed toward the front part of the eye, being replaced by liquid as the process continues. As the vitreous shrinks, it pulls away from the surface of the retina. In most cases, this pulling away or [vitreous separation](#) occurs without any negative effect. A patient may notice floaters but no significant visual damage occurs. In some individuals, however, there may be an area where the vitreous is firmly attached to the surface of the retina. As the shrinkage and forward movement of the vitreous progresses, traction or pulling can be exerted on the retina, and eventually a small hole may form. If the hole occurs in the outer or peripheral portion of the retina, a retinal tear or detachment may result. If, on the other hand, the vitreous is firmly attached to the central portion of the retina (the macula) then shrinkage and movement of the vitreous can result in the formation of a hole in this region, known as a **macular hole**. The fluid which has replaced the vitreous jell in many areas may then seep through the hole, causing a localized separation of the retina centrally. This process results in a defect or dark spot in the central vision with distortion and central vision loss resulting.

Symptoms of a macular hole are common to most conditions affecting the central part of the retina. They include: decreased central vision for both distance and reading activities, [distortion in central vision](#), a small defect in the central vision where small letters may disappear. The diagnosis of a macular hole is made when an ophthalmologist performs a dilated retinal examination and examines the back of the eye. A fluorescein angiogram (injection of a dye into the vein with photographs taken of the back of the eye) may be recommended to evaluate the situation and ensure that the macular hole is due to the vitreous traction as described above, and not secondary to other rare conditions in the back of the eye. OCT testing is probably the simplest test to diagnose and evaluate a macular hole as it will show a hole in the central macula.

Until recently, very little could be done to correct the visual deficit resulting from macular holes. As a result of the introduction of microsurgical techniques, it is now possible to offer a surgical procedure with the potential for some visual

improvement. This procedure is known as a [vitrectomy](#), and involves the microscopic surgical removal of the vitreous jelly within the center of the eye. Particular attention is paid to removing any of the vitreous attachments from the macula, thus releasing the traction or pulling on the retina which caused the macular hole initially. This permits settling of the retina against the wall of the eye.

In order to completely close the macular hole, however, additional pressure must be exerted on this portion of the retina to allow for complete healing to take place. To assist in this process, a large gas bubble is placed within the eye, which, when it comes into contact with the retina, presses it against the wall of the eye, sealing the macular hole. This process acts much like a hand holding wall paper against the wall permitting it to stick and remain in position as the “wallpaper glue” dries.

In order to have its maximal effect, the gas bubble must apply continued **upward** pressure against the retinal surface in the area of the macula. Because the macula is located in the back part of the eye, a patient’s head must remain in a “face–down” orientation to allow the air bubble to rise toward the back of the eye and exert this pressure. Patients must maintain this face–down position for approximately 2–3 weeks after surgery in order to achieve successful closure of the macular hole and maximize the chances for vision improvement. This face–down positioning is the single most critical portion of the procedure for closing macular holes. As a result, emphasis must be placed on the patient’s ability to cooperate with strict face–down positioning **at all times** for a period of approximately two to three weeks after surgery in order to achieve a successful outcome. In order to increase the patient’s ability to comply with these instructions, numerous devices have been developed that assist the patient in maintaining this face–down position throughout the day and at night as well. Devices can be purchased or rented from a variety of companies that permit more comfortable positioning during sleep as well as allowing the patient to maintain a face–down position while eating and reading.

At the end of the 2–3 week period of strict face–down positioning, the patient is then permitted to resume a more normal upright posture. The gas bubble itself, however, may take anywhere from 6–8 weeks following surgery to completely disappear. The air bubble is gradually resorbed by the body, and the vitreous cavity is then filled with liquid produced by cells in the front of the eye. Importantly, patients who have a gas bubble in their eye cannot fly in an airplane and must stay at sea level. This is because at high altitudes the gas can expand and cause the eye pressure to go up to dangerous levels.

The surgical procedure itself is performed typically under local anesthesia and patients go home that same day. A postoperative examination within 24 hours of surgery is required in all cases. Regular follow–up examinations are performed during the first three weeks of recovery, to monitor for successful closure of the

hole, observe for any potential complications, and to reinforce the importance of face-down positioning. Patients typically utilize several eye drops applied to the operated eye over the course of several weeks following the surgical procedure.

Approximately 6–8 weeks after surgery, when the bubble has completely resorbed, the patient is measured for glasses. Full visual recovery may not occur until as late as three months after the surgical procedure.

As with all surgical procedures, there are potential complications or side-effects associated with the repair of the macula hole. These include a small percentage of patients who develop retinal tears or detachments during the surgical procedure itself, or in the immediate postoperative period. These problems are usually repairable.

In patients who have not already undergone cataract surgery, the development of a cataract occurs in almost all individuals within six months to two years. Surgical removal of the cataract and placement of an intraocular lens is then required.