In patients with glaucoma, the IOP at baseline—regardless of its actual level—is too high for retinal ganglion cell function and survival. It has been shown that in most patients with glaucoma, lowering the IOP will stop or slow visual field loss. In some eyes, however, optic nerve damage may progress despite treatment to lower the IOP. Clinicians often imprecisely use the word *glaucoma* in describing conditions in which the IOP is elevated in the absence of known glaucomatous neuropathy. Although this is common parlance, it should be avoided.


**Classification**

**Open-Angle, Angle-Closure, Primary, and Secondary Glaucomas**

Adult forms of glaucoma are classified as open angle or angle closure and as primary or secondary (Table 1-1). Pediatric forms of glaucoma are described in Chapter 11. Distinguishing open-angle glaucoma from angle-closure disease is essential from a therapeutic standpoint.

**Open angle**

In *open-angle glaucoma* (OAG), no obstruction of the trabecular meshwork is visible on gonioscopic examination of the anterior chamber angle. The condition is further classified as *primary open-angle glaucoma* (POAG) when no underlying abnormality known to cause
neuropathy, it is known as angle-closure glaucoma. Angle closure is classified as primary in the absence of an underlying disorder to explain the mechanism of iridotrabecular contact or secondary when the angle closure can be attributed to certain disease processes (see Table 1-1). Globally, primary angle closure is a major public health problem.

Normal aqueous humor flow in the anterior segment is illustrated in Figure 1-2A. In primary angle closure (and in some forms of secondary angle closure), the flow of aqueous humor from the posterior to the anterior chamber is obstructed at the pupil (Fig 1-2B). The resulting pressure gradient pushes the peripheral iris forward into the anterior chamber angle. This is known as pupillary block angle closure.

In some forms of secondary angle closure and in plateau iris, the peripheral iris or the entire lens–iris interface is pushed forward, narrowing the iridocorneal angle (see Chapter 9 in this volume). This can result from an abnormality of the ciliary body, posterior segment tumors, hemorrhage, or other causes described in Chapter 10. In other forms of secondary angle closure, the peripheral iris is pulled forward, typically by contraction of a cellular, fibrovascular, or inflammatory membrane. These conditions are called non-pupillary block angle closure.

Figure 1-2  Aqueous humor flow. A, Normal flow of aqueous humor from the posterior chamber, through the pupil, and into the anterior chamber. Aqueous humor exits the eye through 2 pathways in the iridocorneal angle: the trabecular meshwork and the uveoscleral pathway. B, In primary angle closure due to pupillary block, the flow of aqueous through the pupil is obstructed, resulting in a positive pressure gradient between the posterior and anterior chambers, anterior displacement of the peripheral iris, and closure of the anterior chamber angle. (Illustration by Mark Miller.)
Slit-Lamp Biomicroscopy

Biomicroscopy of the anterior segment is performed to detect signs of underlying ocular conditions that may be associated with glaucoma or ocular hypertension, to evaluate the eye in preparation for glaucoma surgery, and to monitor the function of a previously performed glaucoma surgery. BCSC Section 8, External Disease and Cornea, discusses slit-lamp technique and the examination of the external eye in greater depth.

Conjunctiva

Eyes with acutely elevated intraocular pressure (IOP) may have conjunctival hyperemia. Long-term use of many ocular hypotensive medications may also cause conjunctival hyperemia. Allergic or hypersensitivity reactions to medications (especially $\alpha_2$-adrenergic agonists) or their preservatives can result in a follicular conjunctivitis. Other potential adverse effects of topical hypotensive drugs include decreased tear production, foreshortening of the conjunctival fornices, and, in severe cases, pseudopemphigoid with conjunctival scarring. Prior to filtering surgery, the presence or absence of subconjunctival scarring or other conjunctival abnormalities is assessed. The presence or absence of any filtering bleb is noted. If a bleb is present, it is characterized as either cystic or diffuse, and its size, degree of elevation, amount of vascularization, and integrity are noted. A Seidel test is performed if a leak is suspected (Fig 4-1).

Figure 4-1  Seidel test. After application of a concentrated fluorescein solution, quenching will block fluorescence unless there is an aqueous humor leak that dilutes the fluorescein. The dark area on the right of these images represents an area of highly concentrated fluorescein. As aqueous humor leaks (arrow, A) the fluorescein is diluted, and an enlarging rivulet of fluorescence is detected (A–C). (Courtesy of Angelo P. Tanna, MD.)
Normal blood vessels in the angle include radial iris vessels, portions of the arterial circle of the ciliary body, and vertical branches of the anterior ciliary arteries. Normal vessels are oriented either radially along the iris or circumferentially (in a serpentine manner) in the ciliary body face. Vessels that cross the scleral spur to reach the trabecular meshwork are
Fistula creation

A paracentesis provides access to the anterior chamber to allow re-formation of the chamber with balanced salt solution or viscoelastic when needed. An incision into the anterior chamber is created under the scleral flap with a sharp blade. A corneoscleral block of tissue is removed (Fig 13-8), creating a fistula that allows aqueous to flow directly from the anterior chamber to the subconjunctival space. The fistula can be made freehand or with a trephining device such as a Kelly Descemet membrane punch. This fistula is typically centered underneath the scleral flap and is small enough so that the flap overlaps it on all sides.

Iridectomy

An iridectomy prevents iris from occluding the fistula (Fig 13-8D). Some surgeons do not perform an iridectomy in selected patients, as it is believed the risk of fistula occlusion is low in certain pseudophakic eyes. The risks of iridectomy (bleeding, inflammation) should be weighed against the risk of fistula obstruction.