



Figure 29-26 The retina and optic nerve in glaucoma. **A**, *Left panel*, normal retina; *right panel*, the retina in long-standing glaucoma (same magnification). The full thickness of the glaucomatous retina is captured (*right*), a reflection of the thinning of the retina in glaucoma. In the glaucomatous retina, the areas corresponding to the nerve fiber layer (NFL) and ganglion cell layer (GC) are atrophic; the inner plexiform layer (IPL) is labeled for reference. Note also that the outer nuclear layer of the glaucomatous retina is aligned with the inner nuclear layer of the normal retina due to the thinning of the retina in glaucoma. See [Figure 29-16](#) for orientation. **B**, Glaucomatous optic nerve cupping results in part from loss of retinal ganglion cells, the axons of which populate the optic nerve. **C**, The *arrows* point to the dura of the optic nerve. Notice the wide subdural space, a result of atrophy of the optic nerve. There is a striking degree of cupping on the surface of the nerve as a consequence of long-standing glaucoma.

The End-Stage Eye: Phthisis Bulbi

Trauma, intraocular inflammation, chronic retinal detachment, and many other conditions can give rise to an eye that is both small (atrophic) and internally disorganized: **phthisis bulbi**. Congenitally small eyes—hypoplastic or *microphthalmic* eyes—are generally not disorganized internally. Phthisical eyes typically show the following changes: the presence of exudate or blood between the ciliary body and sclera and the choroid and sclera (*ciliochoroidal effusion*); the presence of a membrane extending across the eye from one aspect of the ciliary body to the other (*cyclitic membrane*); chronic retinal detachment; optic nerve atrophy; the presence of intraocular bone, which is thought by many to originate from *osseous metaplasia* of the RPE; and a thickened sclera, especially posteriorly. Ciliochoroidal effusion is typically associated with the physiologic state of low intraocular pressure (*hypotony*). The normal pull of the extraocular muscles on a hypotonous eye may render the appearance of the eye as square rather than round.

SUGGESTED READINGS

The Orbit

- Douglas RS, Gupta S: The pathophysiology of thyroid eye disease. *Curr Opin Ophthalmol* 22:385, 2011. [An excellent overview of the current understanding of the pathogenesis of thyroid eye disease and a discussion of the pathologic basis of therapeutic strategies.]
- Stone JH, Khosroshahi A, Deshpande V, et al: Recommendations for the nomenclature of IgG4-related disease and its individual organ system manifestations. *Arthritis Rheum* 64:3061, 2012. [A comprehensive examination of the relationship between the expression of IgG4 in localized and systemic inflammatory disease, including the orbit.]
- Wallace ZS, Khosroshahi A, Jakobiec FA, et al: IgG-4 related systemic disease as a cause of "idiopathic" orbital inflammation including orbital myositis, and trigeminal nerve involvement. *Surv Ophthalmol* 57:26, 2012. [Through the detailed analysis of the case and a review of the literature, the authors distinguish between IgG-related disease in the orbit and other forms of orbital inflammation.]

The Eyelid and Conjunctiva

- Deprez M, Uffer S: Clinicopathological features of eyelid skin tumors. A retrospective study of 5504 cases and review of the literature. *Am J Dermatopathol* 31:256, 2009. [A comprehensive review of eyelid neoplasms.]
- Verma V, Shen D, Sieving PC, et al: The role of infectious agents in the etiology of ocular adnexal neoplasia. *Surv Ophthalmol* 53:312, 2008. [This review addresses the role of infectious agents in disorders of the eyelid and conjunctiva such as Kaposi sarcoma, squamous papilloma and squamous cell carcinoma, and periocular lymphoma.]