

The conjunctiva lining the interior of the eyelid, the *palpebral conjunctiva*, is tightly tethered to the tarsus and may respond to inflammation by being thrown into minute papillary folds as may occur in allergic conjunctivitis and bacterial conjunctivitis. The conjunctiva in the *fornix* is a pseudostratified columnar epithelium rich in goblet cells. The fornix also contains accessory lacrimal tissue, and the ductules of the main lacrimal gland pierce through the conjunctiva in the fornix superiorly and laterally. The lymphoid population of the conjunctiva is most noticeable in the fornix, and in *viral conjunctivitis*, lymphoid follicles may enlarge sufficiently to be visualized clinically by slit-lamp examination. Granulomas associated with systemic sarcoidosis may be detected in the conjunctival fornix, and the yield of granulomas from a nondirected conjunctival biopsy in individuals suspected of having sarcoid may be as high as 50%. Primary lymphoma of the conjunctiva (typically indolent marginal zone B-cell lymphoma) is most likely to develop in the fornix. The *bulbar conjunctiva*—the conjunctiva that covers the surface of the eye—is a nonkeratinizing stratified squamous epithelium. The limbus, the intersection between the sclera and cornea, also marks the transition between conjunctival and corneal epithelium (Fig. 29-1).

The conjunctiva, like the eyelid, is richly invested with lymphatic channels. Malignant neoplasms arising in the eyelid and conjunctiva tend to spread to regional lymph nodes (parotid and submandibular node groups).

Conjunctival Scarring

Many cases of bacterial or viral conjunctivitis cause redness and itching, but most heal without sequelae. However, infection with *Chlamydia trachomatis* (trachoma) may produce significant conjunctival scarring. Conjunctival scarring is also seen after exposure of the ocular surface to caustic alkalis or as a sequela to ocular cicatricial *pemphigoid* (Chapter 25). A reduction in the number of goblet cells due to conjunctival scarring leads to a decrease in surface mucin, which is essential for the adherence of the aqueous component of tears to the corneal epithelium. Thus, even if the aqueous component of the tear film is adequate, the affected individual will suffer from a dry eye. More commonly, however, dry eye results from a deficiency in the aqueous component of the tear film generated by the accessory lacrimal glands embedded within the eyelid and fornix.

The conjunctiva may be scarred iatrogenically through reaction to drugs or as a consequence of surgery. In other parts of the body, cancer surgery requires excision of the lesion with a margin of normal tissue to ensure complete removal. However, extensive surgical excision of even diseased conjunctiva can remove a large number of goblet cells or compromise lacrimal gland ductules that traverse the conjunctiva. Thus, removal of a conjunctival neoplasm or a precursor lesion may leave the affected individual with a painful dry eye that can compromise vision. Therefore, surgeons often remove only the invasive components of conjunctival neoplasms, and treat the intraepithelial components with tissue-sparing modalities such as cryotherapy or topical chemotherapy delivered as eye drops.

Pinguecula and Pterygium

Both *pinguecula* and *pterygium* appear as submucosal elevations on the conjunctiva. They result from actinic damage and are therefore located in the sun-exposed regions of the conjunctiva (i.e., in the fissure between both the upper and lower eyelids—the interpalpebral fissure). Pterygium typically originates in the conjunctiva astride the limbus. It is formed by a submucosal growth of *fibrovascular connective tissue that migrates onto the cornea*, dissecting into the plane occupied normally by the Bowman layer. Pterygium does not cross the pupillary axis and, aside from the possible induction of mild astigmatism, does not pose a threat to vision. Although most pterygia are entirely benign, it is worthwhile submitting the excised tissue for pathologic examination because, on occasion, precursors of actinic-induced neoplasms—squamous cell carcinoma and melanoma—are detected in these lesions.

Pinguecula, which, like pterygium, appears astride the limbus, is a small, yellowish submucosal elevation. Although the pinguecula does not invade the cornea as pterygium does, the presence of a focal conjunctival elevation near the limbus can result in an uneven distribution of the tear film over the adjacent cornea. As a consequence of focal dehydration, a saucer-like depression in the corneal tissue—a *delle*—may develop.

Neoplasms

Both squamous neoplasms and melanocytic neoplasms and their precursors tend to develop at the limbus. Conjunctival *squamous cell carcinoma* may be preceded by intraepithelial neoplastic changes analogous to those seen in the evolution of cervical squamous cell carcinoma. In the conjunctiva the spectrum of changes from mild dysplasia through carcinoma in situ is designated as *conjunctival intraepithelial neoplasia*. Squamous papillomas and conjunctival intraepithelial neoplasia may be associated with the presence of human papillomavirus types 16 and 18. Although conjunctival squamous cell carcinoma tends to follow an indolent course, *mucoepidermoid carcinoma* of the conjunctiva (reflecting the ability of conjunctival stem cells to differentiate into squamous epithelium and goblet cells) follows a much more aggressive course.

Conjunctival nevi are encountered commonly but seldom invade the cornea or appear in the fornix or over the palpebral conjunctiva. Pigmented lesions in these zones of the conjunctiva most likely represent melanomas or melanoma precursors. Compound nevi of the conjunctiva characteristically contain subepithelial cysts lined by surface epithelium (Fig. 29-6A, B). In late childhood or adolescence, conjunctival nevi may acquire an inflammatory component rich in lymphocytes, plasma cells, and eosinophils. The resultant *inflamed juvenile nevus* is completely benign.

Conjunctival melanomas are unilateral neoplasms, typically affecting fair-complexioned individuals in middle age (Fig. 29-6C, D). Most cases of conjunctival melanoma develop through a phase of intraepithelial growth termed *primary acquired melanosis with atypia*, which is roughly analogous to *melanoma in situ* but does not correspond neatly to the radial growth phase of cutaneous melanoma (Chapter 25). Between 50% and 90% of individuals with incompletely treated primary acquired melanosis with