Central Corneal Thickness and Thickness of the Lamina Cribrosa and Peripapillary Sclera in Monkeys

In the Ocular Hypertension Treatment Study, central corneal thickness (CCT) has been recognized as a significant risk factor for progression of ocular hypertension to primary open-angle glaucoma. Consequently, Herndon et al demonstrated that CCT was inversely correlated with the amount of glaucomatous optic nerve damage at the time of referral of the patient. Several investigations confirmed that a thin cornea was a risk factor for development and progression of glaucoma. It has remained unclear whether a thin cornea was a clinical risk factor because the falsely low intraocular pressure measurements were not corrected for their dependence on CCT or whether a thin cornea was additionally a structural risk factor potentially due to an association with a thin lamina cribrosa. According to biomechanical considerations, a thin lamina cribrosa may be a risk factor for increased glaucoma susceptibility. We therefore conducted this study to assess whether corneal thickness is associated with the thickness of the lamina cribrosa.

Methods. The histomorphometric study included 22 monkey eyes (Macaca mulatta) that had undergone a temporary experimental occlusion of the central retinal artery. On anteroposterior histological sections through the pupil and the central optic disc region, thicknesses of the cornea and lamina cribrosa were measured in the center, at the periphery, and between the center and the periphery. Additionally, the peripapillary scleral thickness was determined at the optic disc border within the optic nerve meninges and just outside the optic nerve meninges. For outlining the borders of the lamina cribrosa, care was taken to differentiate the anterior lamina cribrosa surface from overlying glial tissue and to delineate the posterior lamina cribrosa from the optic nerve. The reproducibility of the technique had been evaluated in a previous study in which 10 randomly selected histological optic disc sections were reevaluated 10 times. The coefficient of variation was 0.14.

Results. The mean (SD) corneal thickness was 675 (114) µm in the center and 875 (107) µm in the corneal periphery. The mean (SD) thickness of the lamina cribrosa was 203 (46) µm in the center and 225 (53) µm in the periphery. The mean (SD) peripapillary scleral thickness was 251 (36) µm within the optic nerve meninges and 407 (63) µm outside the optic nerve meninges. The CCT was statistically not associated with the thickness of the lamina cribrosa in the optic disc center (P = .31) (Figure 1) or in the periphery of the optic nerve head (P = .29), nor was it associated with the thickness of the sclera within the optic nerve meninges (P = .41) (Figure 2) or outside the optic nerve meninges (P = .16). In a similar manner, the peripheral corneal thickness was statistically not associated with the thickness of the lamina cribrosa.
To the best of our knowledge, it has never been reported to occur in the eyelid. Chronic localized fibrosing vasculitis (CLFV) is a rare entity of unknown etiology. To our knowledge, it has never been reported to occur in the eyelid. Chronic localized fibrosing vasculitis is characterized by a nonspecific inflammatory reaction with vasculitis of small vessels with a distinctive centric pattern of fibrosis.

Comment. Chronic localized fibrosing vasculitis, an entity that was first described by Carlson and LeBoit in 1997, is characterized by a nonspecific inflammatory reaction with vasculitis of small vessels with a distinctive centric pattern of fibrosis.

Although CLFV may be considered a variant of inflammatory pseudotumor of the skin, there are distinct differences. The presence of vasculitis and leukocytoclastic vasculitis (nuclear debris) and the absence of dense plasma cell infiltrate in our case clearly distinguished it from cutaneous inflammatory pseudotumor. The distinction between the 2 entities may also have prognostic implications as CLFV (classified as vasculopathic reaction pattern) is characterized by a nonspecific inflammatory reaction with vasculitis of small vessels with a distinctive centric pattern of fibrosis.

The patient was started on topical tacrolimus ointment and is currently being followed up.