Chapter 5
Translaminar Pressure Gradient

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Translaminar pressure gradient (TPG) is another important parameter in glaucoma, as optic nerve head is not only affected by intraocular pressure (IOP) and intracranial pressure (ICP) but also by the thickness of the lamina cribrosa. Indeed, TPG might be the single most important pressure related parameter for the development and progression of glaucoma [1, 2]. TPG is defined as the difference between IOP and ICP per unit thickness of the lamina cribrosa [(IOP − ICP)/thickness of the lamina cribrosa] [3]. The ability of the lamina cribrosa to withstand TPG also depends on the surrounding extracellular matrix and the peripheral scleral tension [4]. Furthermore, the inherent heterogeneity of the lamina cribrosa also plays a significant role in determining the distribution of the pressure gradient [5]. The integrity and resilience of the lamina cribrosa in maintaining its shape is extremely important for protecting the health of the structures that pass through it [4, 6].

The thickness of a normal lamina cribrosa is around 450 μm with a calculated TPG of about 1 mmHg per 100 μm [2, 3]. The thinner lamina cribrosa determines a higher TPG and create a steeper path that retrograde axonal transport must traverse. Jonas et al. reported that lamina cribrosa is thinner in myopes and that there are morphometric changes in lamina cribrosa in glaucomatous eyes, including thinning [2, 7]. Interestingly, experimental studies revealed that lamina cribrosa thickens at the earliest stage of glaucoma [8] and getting thinner at advanced stages of glaucoma [9, 10]. This might explain why eyes with advanced glaucomatous damage and thinner lamina cribrosa are at higher risk of progression compared with eyes with mild or moderate disease [11].

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