Peripapillary Atrophy and Displacement of the Lamina Cribrosa in Open-angle Glaucoma and Ocular Hypertension

Ali S. Hafez MD PhD1,2, and Jella Angela An MD1

Department of Ophthalmology, McGill University1 and Maisonneuve-Rosemont Hospital, University of Montreal2
Montreal, Quebec, Canada

Introduction

Beta zone of peripapillary atrophy (PPA), defined as an inner crescent of chorioretinal atrophy with visible sclera and choroidal vessels, is a significant risk factor for structural and functional progression in glaucoma. However, little is known about the pathogenesis of PPA and its relationship to glaucoma.

Glucoma susceptibility may be related to intraocular pressure (IOP)-induced laminar deformational strain on the surrounding tissues, which eventually collapse. This could reduce choroidal perfusion and oxygen supply to the peripapillary area, causing and enlarging PPA, and damaging the optic disc. Deformation of the surface of the ONH relative to the lamina cribrosa (LC) after artificial changes of IOP has been recognized and extensively quantified.

Objective

To investigate the relationship between the presence of peripapillary atrophy, lamina cribrosa compliance and progression of glaucomatous optic neuropathy in patients with open-angle glaucoma (OAG) and ocular hypertension (OHT)

Selection criteria:

• Clinical diagnosis of OAG or OHT
• No other abnormal ocular findings including high myopia (≥6.00D) and excluding pseudophakia
• Sustained IOP reduction of at least 20% and minimum 4 weeks follow-up
• High quality (SD <30um) confocal scanning laser tomographic (Heidelberg Retinal Tomograph) measurements of ONH before and after IOP reduction

Methods:

Patients were assigned to the PPA or Control group based on the presence of minimum 250 µm of temporal β-PPA on HRT images.

LC compliance was estimated by the change in mean and maximum cup depth relative to the retinal surface following sustained IOP reduction.

Visual field (VF) progression was assessed using two-tailed student’s t-test, ch-square test and Point-Biserial correlations.

Results

Changes in mean and maximum cup depth following therapeutic IOP reduction was not significantly different between PPA and NOR groups.

Changes in mean and maximum cup depth following sustained IOP reduction were not significantly different between PPA and OHT patients.

Conclusion

Presence of PPA is associated with greater LC compliance in OAG patients but not in OHT patients. Both PPA presence and LC compliance were found to correlate significantly with long-term progression of glaucoma patients, indicating their possible role in the development of glaucomatous optic neuropathy.

References