Optic disc morphology and NAION

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Non-arteritic anterior ischaemic optic neuropathy (NAION) is a widespread visually disabling disease in the middle-aged and elderly population. Based on clinical observations by Hayreh, Beck, Savino and others, a low cup/disc diameter ratio and a small optic disc have been described to be structural factors associated with the disease. The physiological correlation between disc size and cup/disc ratios explains why both parameters have been connected with NAION. Hayreh and colleagues discussed that a nocturnal arterial hypotension may lead to a small circumscribed ischaemia in the optic nerve head. In normal-sized discs or large discs, this ischaemic event may go unnoticed and may not be associated with clinically detectable functional deficits. In eyes with low cup/disc ratios and thus a small optic disc, however, the ischaemia-induced tissue swelling may lead to an occlusion of the collateral capillaries due to the lack of space. It may lead to a vicious circle resulting in a segmental infarct of the optic nerve head, predominantly in the superior half of the optic disc. The association with the nocturnal arterial hypotension may explain why most patients notice the loss in vision in the morning. The swelling as a cause for the collateral capillary occlusion may explain why a recent large-scale study suggested that systemic steroid therapy during early-stages NAION has a significant beneficial effect for visual outcome.

The association between NAION and a small optic disc or low cup/disc ratios has been described in quite a number of hospital-based studies in which the sizes of the optic disc and optic cup were assessed clinically or were measured on optic disc photographs. The interethnic differences in the optic disc size with Caucasians having relatively small optic nerve heads, Asians having medium-sized optic discs and Africans having the largest optic nerve heads led to the assumption that the prevalence and incidence of NAION may also differ between various ethnic groups, in an inverse relationship to the interethnic differences in optic disc size: the frequency of NAION would be the highest in Caucasians and lowest in Africans.

In the study by Chan and colleagues from Hong Kong (see page 731), the authors confirm that the association of NAION with a low cup/disc diameter ratio may also be valid for Chinese patients affected by the disease. Using confocal laser scanning tomography and optical coherence tomography to measure the optic nerve head structures, the optic cup area and the cup/disc ratio were significantly smaller in a group of 22 patients with unilateral NAION compared with a control group of 52 randomly selected normal subjects. This suggests that Hayreh’s concept of a lack of space inside the optic disc as a secondary factor to nocturnal arterial hypotension in the pathogenesis of NAION may also be valid for the development of the disease in Chinese patients. Interestingly, Chan and colleagues did not detect a significant difference in the optic disc size between the NAION group and the control group. This is in agreement with a recent study by Contreras et al. Future studies may address whether the discrepancy between these studies and other investigations may be due to interethnic differences in the optic nerve head structure or whether the differences in the sample sizes and techniques to measure the optic disc size may explain it.

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