Supplementary Files

Appendix. Methods

Supplementary Figure Representative cases of a healthy control eye and eyes with nonarteritic ischemic optic neuropathy.

References of Supplementary Files
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Inclusion and exclusion criteria

NTG was defined as the presence of glaucomatous optic nerve damage (i.e., neuroretinal rim thinning/notching, and an RNFL defect in the corresponding region), a corresponding glaucomatous VF defect, open iridocorneal angle on gonioscopic examination, maximum diurnal IOP ≤21 mmHg (without glaucoma medications), no prior history of long term use of steroid medication and no identifiable secondary cause of glaucoma. A glaucomatous VF defect was defined as (1) outside the normal limits on a glaucoma hemifield test, (2) three abnormal points with a <5% probability of being normal, and one abnormal point with a <1% probability of being normal by pattern deviation, or (3) a pattern standard deviation of <5% confirmed on two consecutive reliable tests, defined as tests with a fixation loss rate ≤20% and false-positive and false-negative error rates ≤25% each.

Subjects in the NAION group were included if they had been diagnosed with NAION at least 6 months prior to study entry. NAION was diagnosed based on the sudden, painless loss of visual acuity with no history of glaucoma or retinal diseases; optic disc edema with or without superficial hemorrhages at the optic disc border and adjacent retina on fundus ophthalmoscopy; VF defects consistent with NAION; and spontaneous resolution of optic disc edema within 2 to 3 months. Patients were excluded if they had symptoms or signs suggesting arteritic ischemic optic neuropathy or giant cell arteritis, such as jaw claudication, anorexia, unintended weight loss, elevated erythrocyte sedimentation rate or elevated reactive protein C levels.

The healthy subjects had an IOP of ≤21 mmHg with no history of increased IOP, an optic disc that did not appear glaucomatous, no visible RNFL defect on red-free photography, and a normal VF. Absence of a glaucomatous disc appearance was defined as an intact neuroretinal rim without peripapillary hemorrhages, notches, or localized pallor. A normal VF was defined as the absence of glaucomatous VF defects and neurologic field defects.

Patients were excluded from the groups if they had a BCVA worse than 20/40, a spherical equivalent of <-8.0 D or >+3.0 D, a cylinder correction of <-3.0 D or >+3.0 D, a history of intraocular surgery except for uneventful cataract surgery, and retinal (e.g., diabetic retinopathy, retinal vessel occlusion, or retinoschisis) or neurological (e.g., pituitary tumor) diseases. Eyes were also excluded if they had optic disc tilt or torsion based on the color photography; optic disc tilt was defined as a tilt ratio between the longest and shortest diameters of the optic disc >1.3,1,2 and torsion was defined as a torsion angle, or deviation of the long axis of the optic disc from the vertical meridian, >15º.2,3
Measurement of blood pressure (BP) and cup-to-disc ratio

Systolic and diastolic BP were measured using a digital automatic BP monitor (Omron HEM-770A, Omron Matsusaka, Matsusaka, Japan). Mean arterial pressure (MAP) was calculated as diastolic BP + 1/3(systolic BP – diastolic BP) and mean ocular perfusion pressure as 2/3(MAP – IOP) at the time of OCTA. Cup-to-disc ratio was defined as the ratio between the vertical diameter of the optic cup and optic disc measured through the center of the optic disc. Cup-to-disc ratio was assessed using the 90 diopter-lens during biomicroscopy or stereoscopic fundus photography.

Image acquisition using OCTA of the Optic Disc

The ONH and peripapillary area were imaged using a commercially available swept-source OCTA device (DRI OCT Triton, Topcon), with a central wavelength of 1050 nm, an acquisition speed of 100,000 A-scans per second, and axial and transversal resolutions in tissue of 7 and 20 μm, respectively. Scans were taken from 4.5 mm × 4.5 mm cubes, with each cube consisting of 320 clusters of four repeated B-scans centered on the optic disc. En-face projections of the volumetric scans made it possible to visualize the structural and vascular details within each segmented layer. This instrument employs an active eye tracker that follows eye movement, detects blinking, and adjusts the scan position accordingly, thereby reducing motion artifacts during the acquisition of OCTA images. Each included B-scan image had an image quality score ≥30, in accordance with the manufacturer’s recommendation. When the quality of the OCTA images was poor (e.g., due to blurring) or when the vascular signal was blocked by artifacts (e.g., blinking or masking), the eye was excluded from the analysis.
Supplementary Figure Representative cases of a healthy control eye (A) and eyes with nonarteritic ischemic optic neuropathy (NAION) (B-D). En-face OCTA images obtained at segmented layers of the prelaminar tissue (PLT) and peripapillary retina (PR) (A1-D1) and the lamina cribrosa (LC) and peripapillary choroid (A2-D2). Color disc images (A3-D3) and circumpapillary OCT showing retinal nerve fiber layer thickness (A4-D4). Note that VD is not decreased in either the PLT (B1-D1) or the LC (B2-D2) in the NAION eyes as compared to the VD in the control eye (A1, A2), despite of the significant loss of RNFL in the NAION eyes.
References of Supplementary Online Contents


