CHAPTER 6

Axonal loss in a patient with anterior ischemic optic neuropathy as measured with scanning laser polarimetry

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Abstract

Case report A 58-year old man with acute AION had repeated NFA/GDx scans of the nerve fiber layer adjacent to the optic nerve head of the involved eye, as well as repeated HFA 30-2 (Humphrey Field Analyzer) visual field examinations. At presentation (day 0), he had a normal superior nerve fiber bundle on the NFA/GDx, with a deep inferior hemifield scotoma. By day 21 and day 36, the superior nerve fiber bundle thinned on the NFA/GDx, whereas the scotoma remained practically unchanged.
These findings suggest that after the onset of an AION, there is acute loss of axonal function resulting in scotoma, presumably due to ischaemia. This is followed by a gradual disappearance of nerve fiber tissue, as measured with the NFA/GDx, within several weeks.

Anterior ischemic optic neuropathy (AION) is thought to result from insufficiency in perfusion of the short posterior ciliary arteries[1] and leads to infarction of axons in the retinal nerve fiber layer (NFL).

The Nerve Fiber Analyzer (NFA; Laser Diagnostic Technologies, San Diego, CA) is a scanning laser polarimeter, designed for the detection and follow-up of glaucoma. It uses a polarized laserbeam to assess NFL thickness in the peripapillary retina, and discriminates well between normals and glaucoma patients.[2,3] The current standard in scanning laser polarimetry is the GDx, a third generation NFA.

A 58-year old white man presented with blurred vision in the inferior visual field of his right eye (day 0). His symptoms had gradually worsened in the previous 10 days. He did not have any headaches, scalp tenderness or jaw claudication. He had no ocular history.

His visual acuity was RE: 20/40 and LE: 20/15. His signs were a swollen optic disc in the right eye. Erythrocyte sedimentation rate (ESR, Westegren) was 4 mm and the C reactive protein (CRP) was less than 1 (normal less than 8). The right eye showed a deep scotoma in the inferior visual field (HFA 30-2, Humphrey Field Analyzer, Humphrey Systems, San Leandro, CA) and a normal superior nerve fiber bundle on the NFA/GDx (Fig 6-1). The left eye was unremarkable.

A diagnosis of non-arteritic AION was made. The patient was treated with aspirin (ASA) 100mg daily, and re-imaged with the NFA/GDx on day 15, 21 and 36. On these days, a visual field test was also performed (Fig 6-2).

A NFA/GDx scan consists of a reflectance image (Fig 6-1, left), a retardation images (Fig 6-1, middle) and a double hump pattern (Fig 6-1, right). The retardation image with a resolution of 65536 pixels relates to NFL thickness. All pixels are color-coded: from yellow to red to blue, the colors represent a gradually thinner NFL. In addition, 14 parameters are on the NFA/GDx printout. One parameter, the superior maximum parameter (smax), has been presented in fig 6-1. The smax is defined as the mean of the 1500 thickest pixels in the superior segment and represents the thickness of the superior nerve fiber bundle.

On day 0, a normal superior nerve fiber bundle was seen with a scotoma in the inferior visual field. On consecutive visits, the visual fields showed no improvement,

apart from some restoration of vision around the blind spot. The superior nerve fiber bundle, however, disappeared on the retardation image within the course of about 3 weeks. The smax parameter decreased from 89µ on day 0 to 62µ (day 15), 49µ (day 21) and 51µ (day 36). After 9 months, the smax was still stable at 48µ.

The case demonstrates that an AION can result in progressive loss of NFL tissue, stabilizing in about 3 weeks.

References

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