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Choroidal Vascular Lesions Identified by ICG Angiography in a Case of Familial Amyloidotic Polyneuropathy

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Background: To describe a patient with familial amyloidotic polyneuropathy (FAP) whose choroidal vascular lesions were demonstrated dynamically with the use of indocyanine green (ICG) angiography.

Case: A 59-year-old man complained of blurred vision due to vitreal amyloidosis in both eyes. Fundus examination after pars plana vitrectomy showed multiple retinal hemorrhages.

Observations: ICG angiography performed after vitrectomy clearly delineated multiple sites of hyperfluorescence indicating tissue staining alongside the major choroidal veins in the lower fundus of his left eye. ICG hyperfluorescence was more evident in the late angiographic phase. Fundus examination and fluorescein angiography revealed no abnormal findings at the corresponding sites of ICG dye leakage.

Conclusions: Choroidal vascular lesions in eyes with FAP were demonstrated in vivo using ICG angiography for the first time. ICG angiography may be very beneficial to evaluate occult choroidal involvement in patients with FAP. **Jpn J Ophthalmol 2003;47:97–101** © 2003 Japanese Ophthalmological Society

Key Words: Choroidal vascular lesions, familial amyloidotic polyneuropathy, fluorescein fundus angiography, indocyanine green angiography.

Introduction

Familial amyloidotic polyneuropathy (FAP) is an autosomal dominantly inherited disorder that is known to cause progressive visual impairment due to vitreous opacity, retinal hemorrhages, or secondary glaucoma. Although retinal vascular lesions have been examined using indirect fundus examination and fluorescein angiography, to our knowledge, no report has described choroidal vascular lesions associated with FAP in vivo in human eyes to date. We report herein a patient with FAP in which the use of ICG angiography identified choroidal vascular lesions dynamically in vivo for the first time.

Case Report

A 59-year-old man reported having blurred vision in the right eye for 2 months and in the left eye for 5 years. He had had floaters in both eyes for 3 years.

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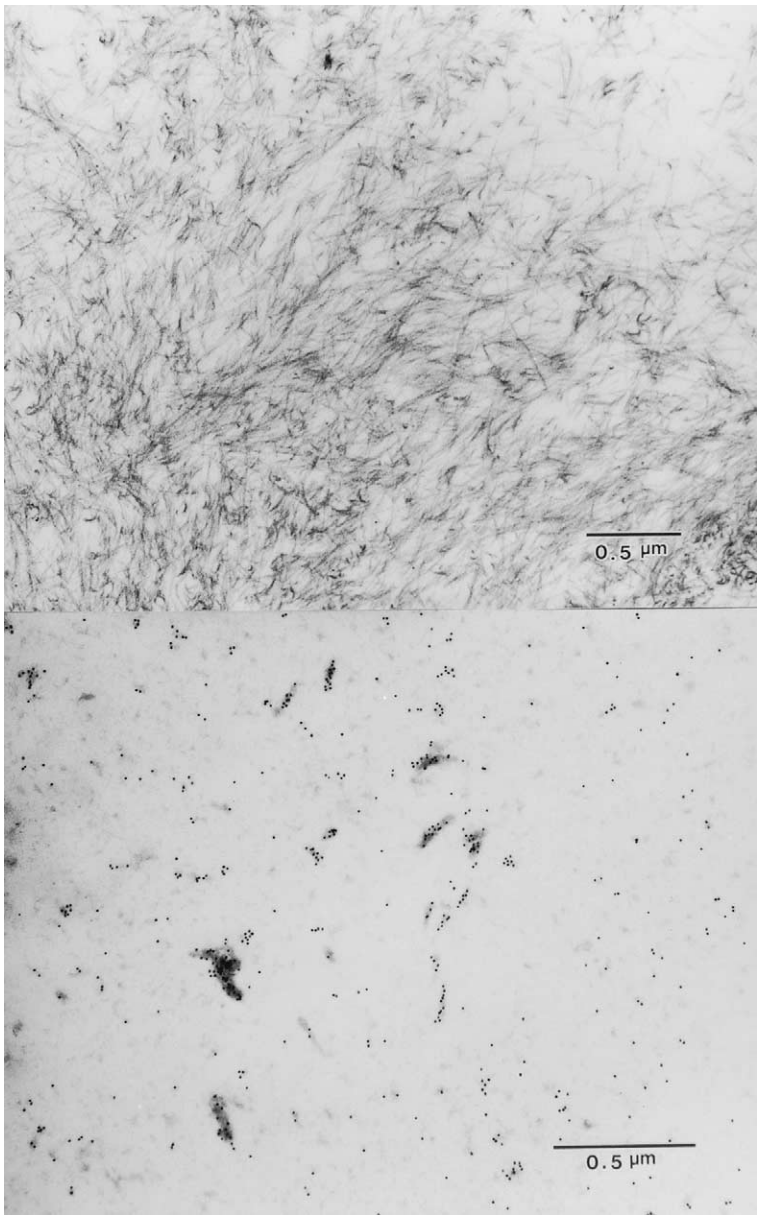

Figure 1. (Top) In a patient with familial amyloidotic polyneuropathy, transmission electron micrograph of amyloidotic vitreous shows randomly distributed and parallel array of amyloid fibrils (1 × 20,000: Bar = 0.5 μm). (Bottom) Immunoelectron microscopy using anti-human transthyretin antibody reveals a dense accumulation of colloidal particles along with amyloid fibrils (1 × 30,000: Bar = 0.5 μm).

At age 49, he had been diagnosed as having type 1 FAP (homozygosity for the transthyretin [TTR] *met*-30 gene) based on gene analysis in peripheral blood samples and histopathological examinations in biopsied specimens of rectal mucosa.[1] Ocular examination at the initial visit revealed a corrected visual acuity of 20/30 in both eyes. The intraocular pressure was 16 mm Hg in both eyes. Slit-lamp microscopic examination showed early subcapsular cataracts bilaterally. Indirect ophthalmoscopy of both eyes revealed numerous strand-like opacities in the vitreous. Because of dense vitreal opacity, the ocular fundus could not be inspected precisely at that time. Based on the suspected diagnosis of bilateral amyloidosis of the vitreous, pars plana vitrectomy was performed to improve the vision in both eyes. A vitreous specimen was submitted for histopathologic examination. Examination of the Congo red-stained specimen of the vitreous under polarized light showed the yellowish green birefringence consistent with findings of amyloidosis. Electron microscopy confirmed the diagnosis of vitreous amyloidosis by showing characteristic fine, nonbranching fibrils (Figure 1, top). Using anti-human TTR antibody, by immunoelectron micros-

Figure 2. (Left) Fundus photographs of the patient's right eye and (Right), left eye. Many white sheathings lie over retinal vessels in both eyes (arrowheads). Scattered retinal hemorrhages are seen in the lower fundus of the left eye (white arrows). In the right fundus, fine retinal vascular anastomotic channels are observed (white arrow).

copy we detected a dense accumulation of colloidal particles along with amyloid fibrils (Figure 1, bottom).

Fundus examinations after vitrectomy showed scattered retinal hemorrhages in the lower fundus of the left eye (Figure 2, right). Many white sheathings lay over retinal vessels in both eyes. Fluorescein angiography performed after vitrectomy showed numerous retinal microaneurysms and mild dye leakage from the retinal vein in the peripheral fundus (Figure 3). ICG angiography conducted at the same time clearly demonstrated multiple sites of hyperfluorescence due to tissue staining alongside the major choroidal veins in the lower fundus (Figure 4). Hyperfluorescence became more evident in the late phase of ICG angiograms. Fundus examination and fluorescein angiography demonstrated no abnormal findings at the corresponding sites of hyperfluorescence demonstrated by ICG angiography.

Discussion

Amyloid is reportedly deposited in various ocular tissues, including the vitreous, iris, lens, and retina.[2] The deposition of amyloid in the choroid has been reported in a few reports only histopathologically on postmortem eyes.[3–5] To our knowledge, this is the first report that identified choroidal vascular lesions associated with FAP using ICG angiography in vivo. ICG angiography in this case demonstrated multiple

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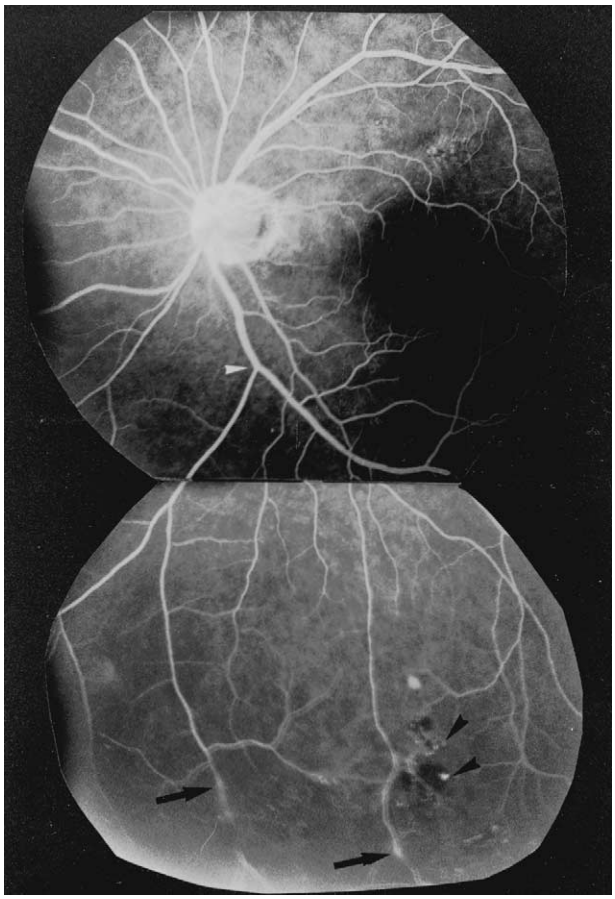

Figure 3. Fluorescein fundus angiograms of the left eye. In the lower fundus, numerous retinal microaneurysms (black arrowheads) and mild dye leakage (arrows) are seen.

areas of hyperfluorescence alongside the major choroidal veins. Because these hyperfluorescent spots did not expand in the late angiographic phase, this hyperfluorescence may be considered to reveal tissue staining of the choroidal vascular walls, probably caused by choroidal vascular damage due to the amyloid deposition on the vascular wall.

The visual symptoms caused by amyloid deposition in the choroid have never been reported, mainly because amyloid deposition has only been identified in postmortem eyes. However, the damage to choroidal vascular walls could lead to vascular obstruction and secondary chorioretinal atrophy. To detect choroidal vascular lesions in eyes with FAP, the use of ICG angiography would be essential for clarifying the exact extent of amyloid deposition in ocular tissue in vivo and to predict possible future complications.

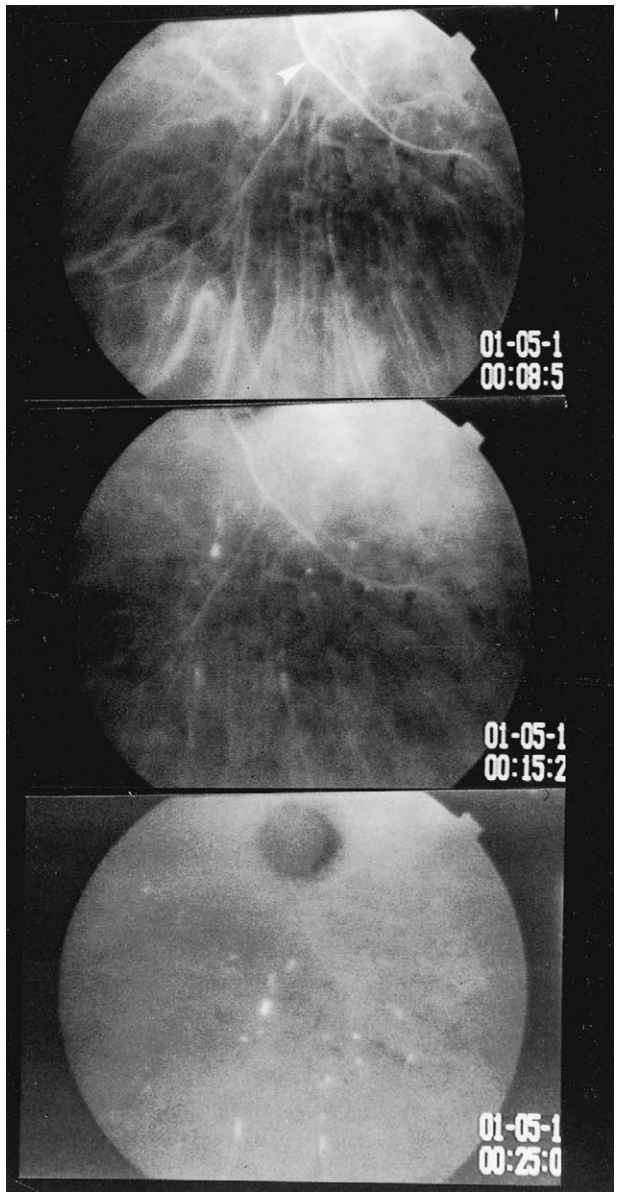

Figure 4. Indocyanine green angiograms of the left fundus: (Top) 8 minutes after dye injection, (Center) 15 minutes after dye injection, (Bottom) 25 minutes after dye injection. Hyperfluorescent spots gradually appear alongside the major choroidal veins in the lower fundus and become more evident in the late angiographic phase. White arrowhead (top angiogram) indicates the same site of bifurcation of the inferior retinal vein as seen in Figure 3 (angiogram at top).

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