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A Case of Frosted Branch Angiitis With Yellowish-White Placoid Lesions: Fluorescein and Indocyanine Green Angiography Findings

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Abstract: Severe, white sheathing of the retinal vessels and yellowish-white placoid lesions, suggesting frosted-branch angiitis, were found in both fundi of a 24-year-old woman. Fluorescein angiography showed hypofluorescence of the placoid lesions in the early phase and hyperfluorescence in the late phase. Indocyanine green angiography showed hypofluorescence during all phases. These findings imply an occlusion of the choriocapillaris. Fluorescein angiography also showed occlusion of the peripheral retinal vessels. With systemic corticosteroids and prostaglandin I_2 derivative, the fundi recovered almost completely to normal 3 months later. **Jpn J Ophthalmol 1998;42:484–489** © 1998 Japanese Ophthalmological Society

Key Words: Frosted branch angiitis, indocyanine green angiography, placoid lesions

Introduction

Frosted branch angiitis is characterized by white sheathing of the retinal vessels, and was first reported by Ito et al[1] in 1976. Since then, similar cases have been reported, but some cases had different clinical features than the original description.

We report on a 24-year-old woman who had good visual acuity in both eyes, but fluorescein angiography (FA) and indocyanine angiography (IA) demonstrated occlusion of the choriocapillaris and the peripheral retinal vessels.

Case Report

A 24-year-old woman first visited our clinic on December 19, 1994, with several days' history of blurred vision and floaters in her right eye. She had a normal first delivery 8 months previously, and had no systemic abnormalities. Her corrected visual acuity was 1.5 and intraocular pressure was 28 mmHg in both eyes. Biomicroscopy of the anterior segment showed fine posterior keratic precipitates, aqueous cells, and flare in both eyes. Nodules were not seen on the iris or on the trabecular meshwork, and no anterior iris synechia were visible. Fundus ophthalmoscopy revealed white sheathing of the retinal veins, diffuse edema of the parafoveal retina and mild hyperemia of the optic disc (Figure 1A). Cells were not observed in the vitreous.

Fluorescein angiography demonstrated mild dye leakage from the white sheathed vessels and from the optic disc, but occlusion of the retinal vessels was not observed (Figure 1B).

Static visual field tests showed bilateral enlargement of the blind spot and some scotomas in the central 30° field.

The amplitudes of the a- and b-waves and the oscillatory potentials of the electroretinograms (ERGs) elicited by bright white flashes were slightly decreased. The light:dark (L:D) ratios of the electrooculograms (EOGs) were 1.58 in the right eye and 1.64 in the left.

Results of laboratory examinations, including serum electrolytes, blood cell counts, angiotensin-converting enzyme, were within normal limits. The serum viral antibody titers to herpes simplex, herpes zoster, cytomegaloviruses, and mycoplasma were all negative. The human lymphocyte antigens (HLA) typing demonstrated A11, B67, B54 (22), CW7, CW1, DR2, and DR8.

We started treatment with systemic prednisolone (30 mg/day) and topical 0.1% betamethasone, on the diagnosis of frosted branch angiitis.

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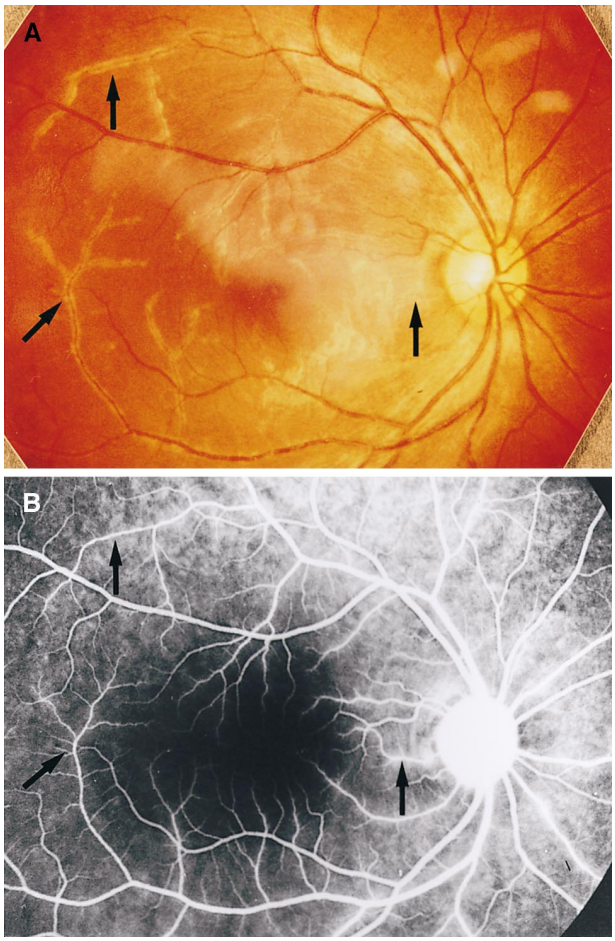

Figure 1. Fundus color photograph and fluorescein angiogram (FA) taken on December 19, 1994; right eye of 24-year-old woman with no systemic abnormalities. (**A**) White sheathing of retinal veins is seen (arrows). (**B**) FA: There is mild dye leakage from sheathed vessels (arrows) and optic disc, but no occlusion of sheathed vessels.

Two weeks later, the inflammations in the anterior chamber had decreased and the intraocular pressure was normal. However, fundus ophthalmoscopy showed an increase in the sheathing of both the arteries and the veins. Retinal edema, 1⁄3–1/5 disc diameter, was present. Yellowish-white placoid lesions and retinal blot hemorrhages were also observed (Figure 2A).

Fluorescein angiography demonstrated a few hypofluorescent spots, including multiple pinpoint leakage and peripheral retinal vascular occlusion in the early phase. In the late phase, there was marked dye leakage from the white sheathed vessels and from the hypofluorescent lesions seen in the early phase (Figures 2B,C,D).

Indocyanine angiography demonstrated hypofluorescent spots slightly larger than those seen with FA (Figures 2E,F), and dye leakage from choroidal vessels. The hypofluorescent spots demonstrated in FA and IA corresponded to the yellowish-white placoid lesions.

We added prostaglandin I_2 derivative for the purpose of circulation recovery. Following a decrease in the vascular sheathing and retinal edema, systemic prednisolone was tapered gradually and prednisolone and prostaglandin I_2 derivative were discontinued after 3 months. The total dosage of prednisolone was 1550 mg.

The ERGs showed recovery of the amplitudes of the a- and b-waves and the oscillatory potentials. The L:D ratio of the EOGs were 2.36 in the right eye and 2.08 in the left.

The retinal edema and hemorrhages disappeared but a few vascular sheathings remained (Figure 3A). FA (Figure 3B) and IA (Figures 3C,D) demonstrated a decrease in dye leakage from the vessels and recanalization of the obstructed vessels. The corrected visual acuity was 1.5 in both eyes, and visual field test revealed no scotomas.

The patient has been followed for 3 years without recurrence.

Discussion

Since Ito et al[1] first reported "frosted branch angiitis" in 1976, 58 cases[1–43] with sheathing of the retinal vessels have been reported. The features and frequency of the ophthalmoscopic findings in these cases are listed in Table 1.

As to the causes of these cases, viral infection by herpes simplex,[12,13,22,27,38] herpes zoster, [2,12,13,22] influenza B, Epstein-Barr,[26] Coxsackie A10,[29] cytomegaloviruses,[32–38] unknown viral infection,[3,4,5,7,16,17,23,30] and HIV-associated retinopathy[32–35] have been reported. In addition, toxocariasis,[15] streptococcal infection,[8,40] rheumatism,[10,31] and allergy[6,7,11,14,18,19,24,26,39] have also been reported to be the cause. In other cases, no specific etiologic factor has been determined.

"Frosted branch angiitis" may be the name of a syndrome associated with widespread sheathing of the retinal vessels due to different causes. In the present case, a previously healthy young woman, fundus changes with yellowish-white placoid lesions suddenly developed, with no preceding signs nor systemic abnormalities. We were not able to identify the etiology of this case.

Retinal vasculitis has been reported in Behçet's disease, sarcoidosis, and syphilis. In our case, Behçet's disease was ruled out because of the lack of the pathognostic triad. The common findings of sarcoi-

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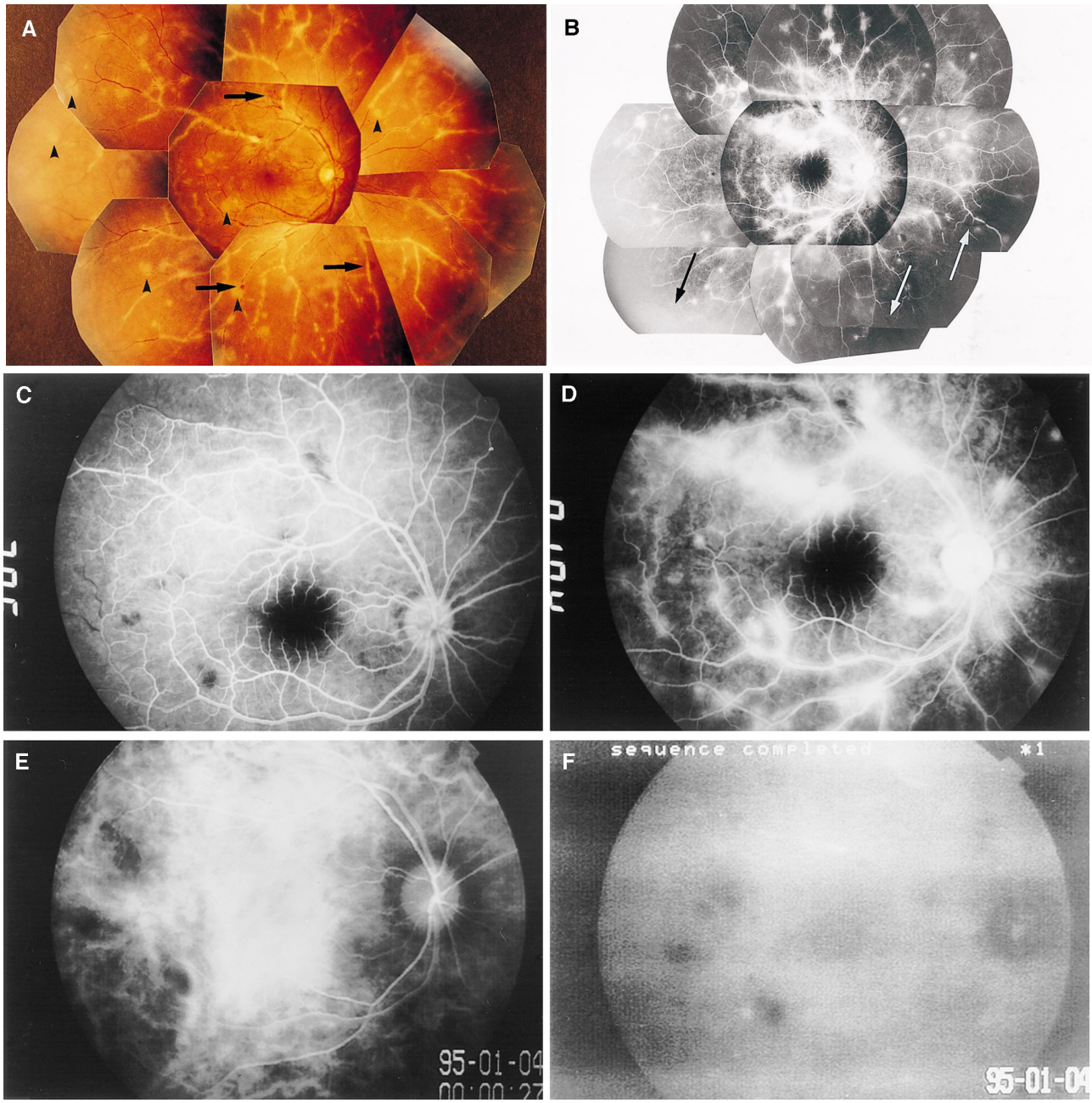

Figure 2. Fundus color photograph, Fluorescein angiogram (FA) and indocyanine green angiogram (IA) taken on January 4, 1995; Right eye of same patient as in Figure 1. (**A**) Severe sheathing of retinal arteries and veins, multiple yellowish-white placoid lesions (arrowheads), blot retinal hemorrhages (arrows) and slight hyperemia of optic disc exist. (**B**) FA: Dye leakage from sheathed vessels, peripheral retinal vascular occlusion (arrows) and placoid lesions can be seen. (**C**) FA, early phase: In temporal area of macula, four hypofluorescent placoid lesions size of 1/3–1/5 disc diameter and two delayed-filling small branch veins are seen. There are two hypofluorescent lesions at superior vascular arcade due to blocking effect by retinal hemorrhages. (**D**)FA, late phase: Dye leakage from retinal vessels and initial hypofluorescence of placoid lesions in early phase exist. (**E**) IA, early phase: Hypofluorescence corresponding to hypofluorescent placoid lesions observed in Figure 2C can be seen. (**F**) IA, late phase: These areas are still hypofluorescent due to filling defect.

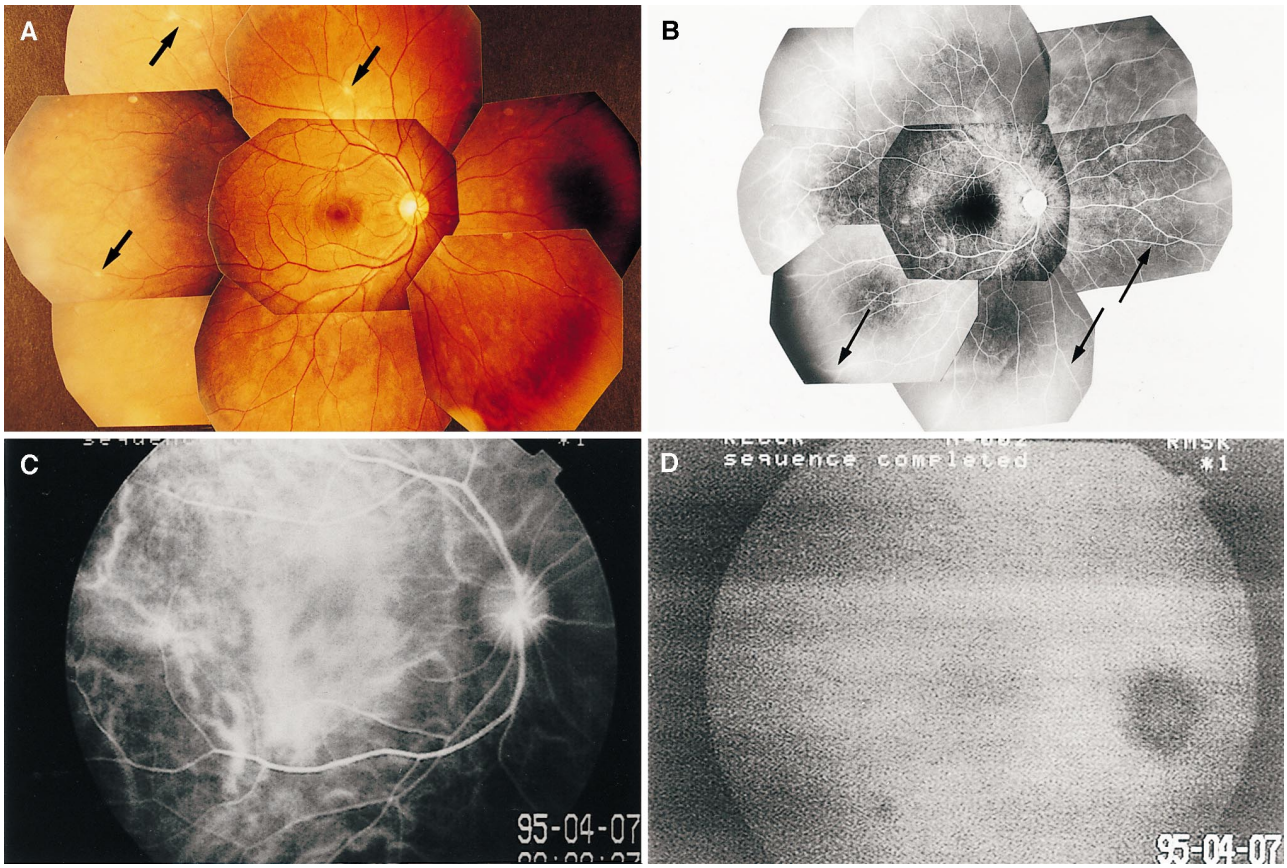

Figure 3. Fundus color photograph. Fluorescein angiogram (FA) and indocyanine angiogram (IA) taken on April 7, 1995; Right eye of same patient as in Figure 1. (**A**) Sheathing of retinal vessels and yellowish-white placoid lesions have almost disappeared, but a few sheathed vessels still remain (arrows). (**B**) FA: Dye leakage from vessels has markedly decreased. Occluded vessels in Figure 2B have recanalized (arrows). (**C**) IA: Early phase; hypofluorescent lesions are unclear. (**D**) IA: Late phase; hypofluorescent lesions are faintly visible and markedly reduced.

dosis, namely, vitreal snowballs, nodules on the trabecular meshwork, bilateral hilar lymphadenopathy, and increase of the serum angiotensin-converting enzyme were not seen. The serum antibody titer for *Treponema pallidum* was negative.

One of the typical features of frosted branch angiitis is that there is no occlusion of the retinal vessels in spite of severe sheathing. However, four cases have been reported to have occlusion of the retinal vessels,[25,31,39,42] and only one case, a choroidal circulation disturbance.[21]

In the present case, FA showed circulation delay and occlusion of peripheral retinal vessels, and IA showed choroidal circulation disturbances. The occluded retinal vessels corresponded to the white sheathed vessels, and the retinal circulation recovered after the disappearance of the sheathing.

The fact that the amplitudes of the oscillatory potentials were diminished in the patient's worst condition and clearly recovered after an improvement in the fundus findings, supports the existence of retinal ischemia.

Choroidal circulation disturbance was found in the yellowish-white placoid lesions. By ophthalmoscopy, they were seen at the level of the retinal pigment epithelium and the size of each lesion was less than 500 μm. FA demonstrated hypofluorescent lesions with multiple pinpoint dye leakages in the early phase and hyperfluorescence in the late phase. Indocyanine angiography demonstrated hypofluorescent lesions through all phases.

Yellowish-white placoid lesions have been reported in multiple evanescent white-dot syndrome (MEWDS), in birdshot retinochoroidopathy, and in acute posterior multifocal placoid pigment epitheliopathy (APMPPE). In MEWDS, numerous small (100–200 μm), discrete white lesions at the level of the retinal pigment epithelium are usually seen uni-

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Table 1. Patients' Age, Affected Eyes and Other Features of Ophthalmoscopic Findings Are Listed for 58 Previously Reported Cases and Our Case

Features	Numbers of Patients (%)	Present Case
Age		
< 20	24 (41%)	
≥20	34 (59%)	24-year-old
Affected eyes		
Both eyes	42 (72%)	Both
Uniocular	16 (28%)	
Gender		
Male	30 (52%)	
Female	28 (48%)	Female
White sheathing of vessels	all	+
Yellowish-white placoid lesions	0	+
Vessel narrowing and/or dilatation	21 (36%)	+
Retinal edema	41 (71%)	+
Serous retinal detachment	10 (17%)	−
Retinal exudate	11 (19%)	−
Retinal hemorrhage	33 (57%)	+
Optic disc hyperemia/edema	26 (45%)	+
Occlusion of retinal vessels	4 (7%)	+
Choroidal circulation abnormality	1 (2%)	+
Neovascularization	7 (12%)	−
Retinal atrophic lessions	17 (29%)	−
Iridocyclitis	39 (67%)	+
Visual acuity[a]		
≥0.5 (both)	9/39 (23%)	+
Intraocular pressure[a]		
≥21 mmHg	3/25 (12%)	+

[a]Visual acuities and intraocular pressures were obtained from reports that contained these data.

laterally. Fluorescein angiography demonstrated hyperfluorescence in the early phase and tissue staining in the late phase. In birdshot retinochoroidopathy, multiple cream-colored lesions are found in the posterior pole, the anterior chamber is quiet, and vitreous shows no inflammation in late 40- to 50-year-old women. There is loss of retinal pigment epithelium in some birdshot lesions, so FA demonstrates areas of hyperfluorescence corresponding to the lesions through all phases.

The similarity of the findings of our case of AP-MPPE was seen in FA and IA.[44–46] There are two explanations for the angiographic findings of AP-MPPE: (a) due to the blockage of the retinal pigment epithelium[44] and (b) due to the filling defect of the choriocapillaris.[45,46] We think that in our case of hypofluorescent areas in the early phase of FA are caused by the occlusion of the choroidal precapillary arterioles that feed the lobules of the choriocapillaris; hyperfluorescence in the late phase is due to the leakage of fluorescein with small molecules from the choroidal vessels into the subretinal space through the damaged retinal pigment epithelium. However, IA demonstrated hypofluorescence in all phases because indocyanine green with large molecules cannot easily leak from these vessels.

In the present case, the inflammation might have been more severe than in previously reported cases and some of the retinal and choroidal vessels were occluded, but recanalization of the vessels had occurred after the inflammation decreased.

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