CASE REPORTS

Optical coherence tomography and autofluoresceingraphy changes in solar retinopathy

Solar retinopathy (SR) is a clinical condition associated with prolonged exposure to sunlight that may lead to a damage of the outer segment of photoreceptors, histologic changes of the retinal pigment epithelium (RPE),[1,2] and increased choroidal thickness.[3] The combination of photochemical effects and thermal energy on the retina explain the physiopathology of this condition.[1,4] Traditionally, SR has been attributed to an exposure to solar eclipse,[1,5] but other causes, like surgical microscope lightning, exposure to arc welding, or sunbathing also have been suggested as potential sources of injury.[4]

Currently, anamnesis and fundoscopic appearance are the main clues for SR diagnosis. However, other techniques such as spectral-domain optical coherence tomography (SD-OCT) or fundus autofluorescence (FAF) can provide further structural analysis, being noninvasive tools to characterize and monitor this condition.[6–8] To the best of our knowledge, only a few reports have studied both FAF- and SD-OCT-monitored SR.[5,9] We provide a new case series showing the clinical usefulness of these technologies in SR.

Methods

We present a prospective, observational case series of 6 eyes from 3 patients who were followed over 3 years in the Department of Ophthalmology of Marina Baixa Hospital (Villajoyosa, Spain). In all cases, SR appeared after sun gazing or sunbathing without appropriate eye protection. Corrected distance visual acuity (CDVA) and demographic data were collected. Likewise, slit-lamp biomicroscopy and fundus examination were performed twice in the first month, once at 6 months, and at the end. Structural analyses were done using the Topcon 3D OCT-2000 system and FAF with the Topcon TRC-NW8F System. OCT examinations were performed twice in the first month and once at the end of the first year of follow-up, and FAF was evaluated in the first visit. Electroretinogram (ERG) was performed at 1 month after the injury in only 2 cases. The follow-up in this small case series ranged from 7 months to 3 years.

Case Presentations

Case 1

A 7-year-old black male reported bilateral central scotoma after sun gazing. CDVA was 20/200 OD and 20/100 OS. Anterior segment examination was unremarkable OU. Dilated fundus examination revealed a bilateral symmetric macular yellow spot (Fig. 1A, 1B) with a full-thickness foveolar hyperreflectivity image in SD-OCT of both eyes (Fig. 1C, 1D). One month later, the macular spot faded to a subtle foveal defect (Fig. 2A, B) with a micro-hole in the outer retina, which remained stable after 3 years of follow-up (Figs. 2C, 2D, 3C, 3D). Visual acuity reached 20/20 OU. FAF imaging showed a foveolar spot of hypoautofluorescence surrounded by a hyperautofluorescent ring in the context of the greater hypoautofluorescent macular area in subacute stage (Fig. 2E, 2F), and a hypoautofluorescent spot was seen 3 years after the injury (Fig. 3E, 3F).

Case 2

A 42-year-old white female with a low myopia, reported blurred vision for 3 months. CDVA was 20/25 in OU. Anterior segment examination was normal. A fine reddish dot foveal defect was seen in OU fundoscopic examination (Fig. 4A, B). SD-OCT study showed a micro-hole in the outer layers of the retina (Fig. 4C, D). On further questioning, she admitted to sun gazing for 1 minute regularly over 1 month as a religious ritual. A foveolar hypoautofluorescent spot OU was revealed by FAF (Fig. 4E, F). One year after injury, visual acuity was about 20/20 OU, and SD-OCT and FAF did not reveal structural changes (Fig.4G–L).

Case 3

A 53-year-old white female displayed RPE changes during routine consultation (Fig. 5A, 5B). Anterior segment was unremarkable. CDVA was 20/20 OU. SD-OCT showed a circumscribed and rectangular-shaped defect in the junction between the inner and outer segments of photoreceptors (Fig. 5C, 5D), and a hypoautofluorescent foveolar spot was seen by FAF OU (Fig. 5E, F). She admitted to sunbathing regularly without adequate eye protection and appeared excessively tanned. CDVA was 20/20 OU without changes over the 3 years as well as SD-OCT and FAF images (Fig. 5G–L)

Discussion

The retina is highly vulnerable to damage by light. Photochemical lesions are mainly located in the outer layers of the central area of the retina and may involve both the photoreceptors and the RPE.[10] A multifactorial pathogenesis has been proposed for the development of SR.[11] Likewise, the evaluation of individual factors is needed to establish a diagnosis of SR. Frequency and intensity of sun exposure, the geographical wavelength spectrum, pupillary size, ethnicity (choroidal and retinal pigmentation), and age are some of the issues that should be taken into account.[1,12] It has been suggested that both higher body temperature and increased chorioretinal pigmentation could contribute to the local tissue damage associated with solar observation.[1,4]

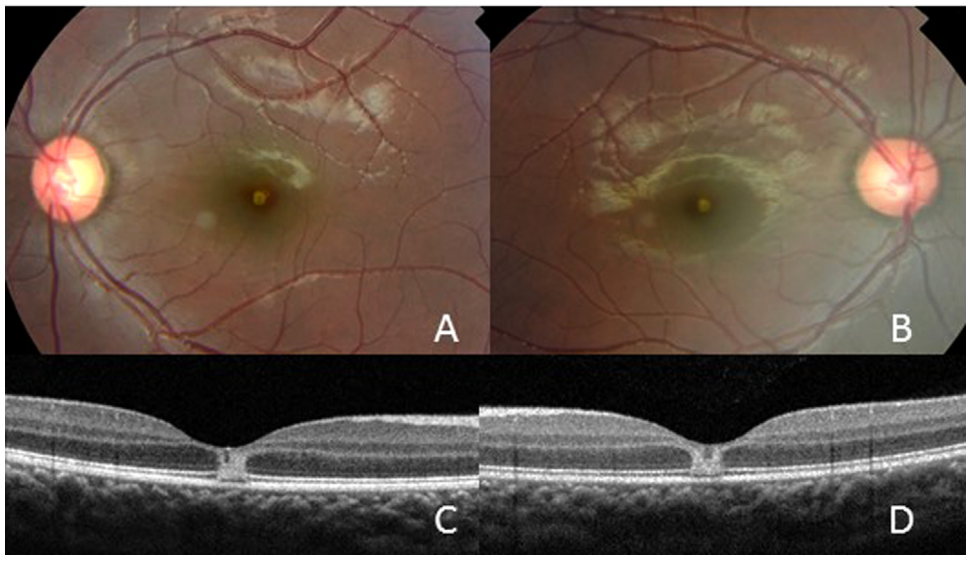

Fig. 1—Case 1: Acute stage. A, B, Colour fundus image shows a yellowish foveolar spot. C, D, An optical coherence tomography picture reveals a full-thickness foveolar hyperreflectivity. Acute stage of fundus autofluorescensce image (FAF) unavailable.

Case 1 raises the question of choriocapillar racial hyperpigmentation in relation to higher temperature increase in the retina. One should note that most epidemiologic studies have been conducted in Western

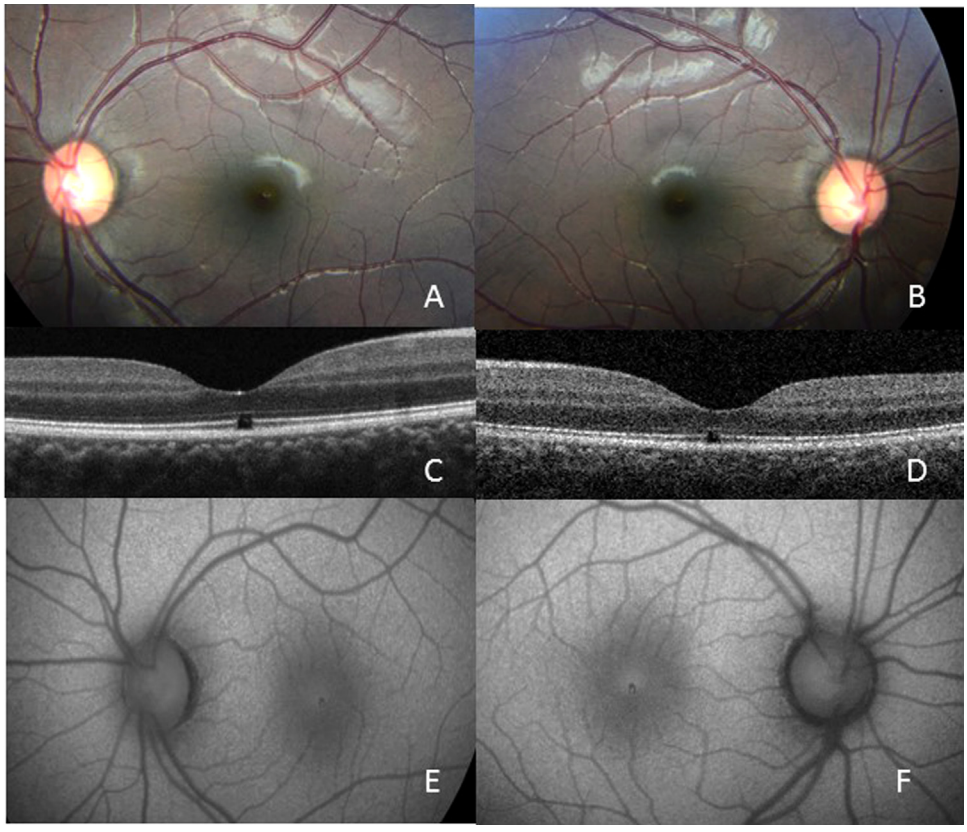

Fig. 2—Case 1: One month after injury (subacute stage). A, B, Colour fundus photograph shows a subtle yellowish spot. C, D, An optical coherence tomography picture reveals a rectangular-shaped micro-hole in the junction between inner and outer segments of photoreceptors. E, F, FAF shows a foveolar spot of hypoautofluorescence surrounded by a hyperautofluorescent halo in the context of the greater hypoautofluorescent macular area 1 month after the exposure.