Case Report

Solar Maculopathy Arising from Nondeliberate Sun Gaze

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Abstract

Solar maculopathy occurs as a result of the effects of exposure of the macula to the harmful light spectrum from the sun. Phototoxic damage of the macula occurs as a result of the exposure to sunlight with some resultant visual deficit. The effect is common during a solar eclipse, where people directly watch the occurrence without sun-filter glasses. Solar maculopathy is also known to occur during religious rituals, and in schizophrenic patients who stare at the sun. Clinical history, subtle clinical biomicroscopic, and optical coherence tomography (OCT) findings are the key in making a diagnosis. Management is conservative with OCT follow-up. Solar maculopathy from nondeliberate sun gazing is not common. We report the case of a 24-year-old African who developed solar maculopathy after nondeliberate exposure to sunlight.

Keywords: Maculopathy, nondeliberate, solar

Introduction

Solar maculopathy (also known as photic retinopathy, foveomacular retinitis, solar retinitis, and eclipse retinopathy) refers to photochemical toxicity and resultant injury to retinal tissues, usually occurring at the fovea.[1]

The longer wavelength end of ultraviolet-A (365–440 nm), visible (400–700 nm), and near infrared (IR) (IRA, 700–1400 nm) light not absorbed by the cornea, lens, and aqueous humour pass through the ocular media, converge on the retina and are absorbed by the photoreceptors and lipofuscin-containing retinal pigment epithelium (RPE) causing damage.[2] They exert their effects on the retina, especially the macula. Histopathological studies have confirmed that the primary lesion occurs in the RPE layer with subsequent photoreceptor damage.[2]

The risk factors of solar maculopathy include male sex, young age, clear intraocular lens, and ingestion of photo-sensitizing drugs such as tetracycline. On the other hand, protective factors include high refractive error, cataract, and darkly pigmented fundi.[1] There are no specific treatment for solar maculopathy. However, there are environmental and behavioral preventive measures such as public education to create the awareness on the dangers associated with looking at the sun as well as the need to use recommended sun-filter glasses when the need arises.[1,2]

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The symptoms are typically bilateral but may be asymmetrical and are characterized by blurred vision, various patterns of scotoma, chromatopsia, headache, and photosensitivity.[2,3]

In the first few days after the exposure, a characteristic yellow-white spot is seen in the fovea, which subsequently changes after several days into a reddish dot, often surrounded by a pigment halo. Mild cases, however, often have no biomicroscopic fundus changes.[1] However, optical coherence tomography (OCT) is very helpful in early and mild cases of solar maculopathy which may be missed by biomicroscopic fundus examination.[2,4]

There have been documented the cases of solar retinopathy arising from deliberate sun gazing during a solar eclipse, religious ritual sands schizophrenic persons who gaze at the sun constantly during manic attack.[5-7] However, to the best of our knowledge, there are few-reported cases of solar retinopathy arising from nondeliberate incidental exposure to sunrays,[8,9] but none has been reported in Nigeria and sub-Saharan Africa.

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We present a case of solar retinopathy arising from nondeliberate exposure to sun rays.

Case Report

A 24-year-old dark-skinned, African male presented with a 2-day history of dark, round shadows in the center of the vision in both eyes. This started immediately after nondeliberate exposure of his eyes to the sun for about 1 min while trying to find the source of a loud noise above him. He immediately noticed a generalized darkening of his vision which gradually localized to persisting dark scotomas in the central vision of both eyes. He also described metamorphopsia. He was otherwise well in himself and had no significant past medical or ocular history. He was not on any medications. There was a history of glaucoma and hypertension in first-degree relatives.

His visual acuities (VA) using Snellen's chat were $6/6^{-2}$ on the right eye and 6/9 on the left eye. I ntraocular pressures were 11 and 12 mmhg in the right and left eyes, respectively. Funduscopy revealed a small-round yellow lesion in the fovea of both fundi [Figure 1]. Other anterior segments and fundi findings were normal.

On OCT scan (Topcon three-dimensional OCT-2000), both eyes showed full-thickness hyperreflectivity that extended from the inner retinal layers to the RPE. The fovea contour was maintained with an average central retina thickness of 228 μ in both eyes [Figure 1].

On follow-up 1 month later, the patient reported nearly complete resolution in the size of the dark-round shadow after image. His VA were 6/6 and $6/6^{-3}$ in the right and left eyes, respectively. Anterior segment examination remained normal for the right eye but with some cells^{++} and flare + in the anterior chamber of the left eye. Funduscopy showed disappearance of foveal yellow spot both eyes. OCT demonstrated full-thickness defects of the photoreceptors' inner segment/outer segment (IS/OS) junction and overlying external limiting membrane hyperreflectivity in both eyes [Figure 2]. The left eye also showed a spot of inner retinal hyperreflectivity with underlying IS/OS junction irregularity [Figure 3]. Central retinal thickness measured 224 μ and 228 μ in the right and left eye, respectively. The patient was placed on Guth: prednisolone 1% qds for the left eye and was scheduled for a review in another 1-month time.

Discussion

The signs and symptoms presentation on the 2nd day in our index patient after the eye exposure to direct sunlight are in keeping with documented signs and symptoms of solar maculopathy.[1-3]

OCT findings are not always consistent. The reported features in early disease seen to occur within 1 week to 6 months of exposure to direct sunlight include, increased retinal thickness, increased retinal hyperreflectivity (as in the index patient), irregular IS/OS junction, and hyperreflectivity of the external-limiting membrane.[4,10] These findings are associated with steady improvement in visual acuity and complete resolution of OCT findings in most cases. These were obvious in our index patient. In late disease regarded as more than 6 months, the complete resolution of scotomas or drastic reduction in their sizes with the resolution of OCT findings in many cases are the usual findings, but few have persisting RPE and IS/OS junction irregularities or develop sharply defined, full-thickness defects of the IS/OS junction resembling lamellar hole.[2,4,10] Although our index patient had VA improvement in both eyes with improved funduscopic findings, and some improvement in OCT findings after 1 month [Figure 2], we did not have the opportunity of a repeat OCT evaluation at 3 and 6 months from the exposure to ascertain complete resolution of residual defect of OCT

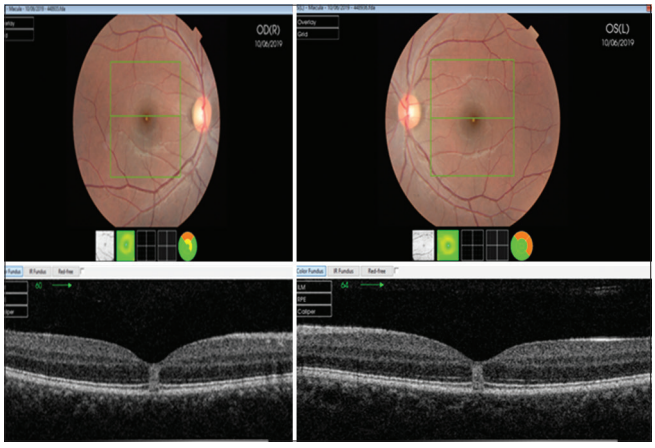

Figure 1: Optical coherence tomography/fundus photograph of index patient 2 days after the onset of symptoms. Fovea contor was maintained with small round yellow glow at the center in both eyes with full-thickness hyperreflectivity that extended from the inner retinal layers to the retinal pigment epithelium

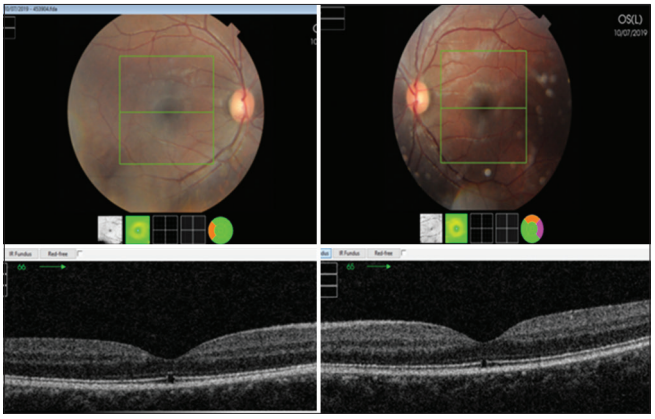

Figure 2: Optical coherence tomography/fundal photograph of index patient at 1 month follow-up with slightly blurry left fundal photograph due to anterior segment inflammation. Both fundi showed the disappearance of foveal yellow spot. Optical coherence tomography demonstrated the full-thickness defects of the photoreceptors' inner segment/outer segment junction and overlying external limiting membrane hyperreflectivity in both eyes

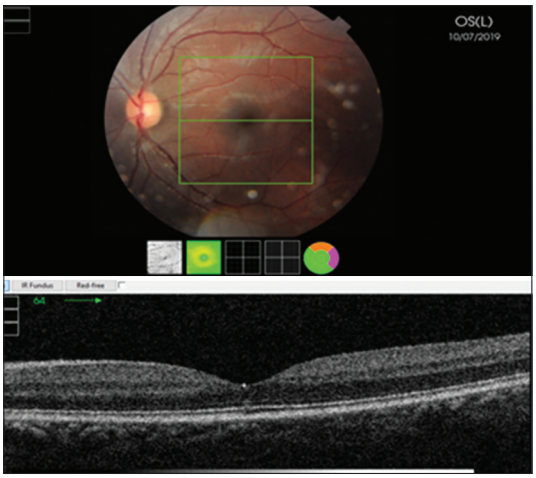

Figure 3: Optical coherence tomography/fundus photograph of the left eye index patient at 1 month follow-up. Showed a spot of inner retinal hyperreflectivity with underlying inner segment/outer segment junction irregularity

findings, as the patient did not report for subsequent follow-up probably because of his satisfaction with the resolution of visual symptoms and improvement of his VA.

The resolution of visual symptoms and retinal lesions start as early as the 1st week and in many cases is completed in 1 to 6 months.[1,11] This was seen in our reported index patient. Despite the subjective improvement of VA, scotomas may persist, reflecting permanent damage to the photoreceptors.[10,11]

Conclusion

Solar maculopathy is a rare ocular lesion that may result from minimal nondeliberate gazing at the sun but usually common in deliberate sun-gazing rituals. In mild cases, there may not be any biomicroscopic findings but only OCT findings. No evidence-based treatment exists for solar retinopathy. Therefore, the prevention through ophthalmic health education on the harmful effect of sun-gazing should be reemphasized. The use of sun filter glasses for those whose outdoor jobs involves looking overhead should be enforced to help prevent solar maculopathy.

Limitation of the report

1. Amsler's grid and Serial Amsler's grid test were not done in this patient which could have confirmed the metamorphopsia described by the patient and follow-up monitoring of metamorphopsia
2. The patient did not report back for the next appointment at 3 months from incidence for further fundal signs documentation.

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Conflicts of interest

There are no conflicts of interest.

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