Optical coherence tomography in late solar retinopathy

Optička koherentna tomografija kod kasne solarne retinopatije

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Abstract

Introduction. Solar retinopathy refers to retinal injury induced by direct or indirect solar viewing. Case report. We presented a patient who had observed partial solar eclipse 51 year before. He had bilaterally decreased vision and scar of the macular region at the time of presentation. The basic diagnostic tool applied in the presented patient, optical coherence tomography, showed hyporeflectivity of the outer retina in the segment of retinal pigment epithelial-photorceptors complex with atrophy and thinning of the foveolar region. Conclusion. Optical coherence tomography is a powerful, non-invasive diagnostic tool which can ease the diagnosis and estimate the level and nature of the macular region damage.

Key words: eye diseases; retinal diseases; sunlight; diagnosis; ophthalmoscopy; tomography, optical coherence.


Ključne reči: oko, bolesti; retina, bolesti; sunčeva svetlost; dijagnoza; oftalmoskopija; tomografija, optička, koherentna.

Introduction

Solar retinopathy (foveomacular retinitis, photoretinitis, photomaculopathy, eclipse retinopathy) refers to retinal injury induced by direct or indirect solar viewing 1.

Damaging effects of sun viewing are known for centuries. In the beginning, foveomacular retinitis was characterized as a syndrome of bilateral decreased vision and foveal lesions in military persons 2.

Solar retinopathy is associated, besides military service, with religious sun gazing, solar eclipse viewing, watching the sun by telescope, psychiatric disorders, and the use of psychotropic drugs and sunbathing 3.

Sunlight produces retinal damage through photochemical effect, which can be enhanced by raising the temperature of the retinal tissue. Direct solar observation through a 3 mm pupil raises the temperature of retina by 4ºC, however, solar observation through a 7 mm pupil raises the temperature of retina by 22ºC, which causes the photocoagulation of retina 4.

The symptoms usually occur several hours after the exposure to sunlight and include unilateral or bilateral vision loss, metamorphopsia, central or paracentral scotoma, chromatops, photophobia, periorbital pain.

The diagnosis is established based on anamnestic data and fundoscopy.

Immediately after exposition, fundus examination reveals small yellow spot surrounded by gray margin in the foveolar or parafoveal area. Fluorescein angiography may be normal or showing minimal changes. Optical coherence tomography demonstrates outer layer abnormal reflectivity of macular area, fragmentation or disorders of inner high reflectivity layer which represents the junction of inner and outer segments of photoreceptors in late solar retinopathy 5, 6.

Case report

A 73-year-old male patient was admitted to our clinic for operative treatment of decreased vision on the left eye. On the occasion of preoperative evaluation we found pseu-
dophakia of the right, senile cataract of the left and chorioretinitis of both eyes. The patient said that on October 2, 1959, he had observed solar eclipse for 3 hours through pale sunglasses.

Partial eclipse on the territory of Serbia began on October 2, 1959 at 11.42 h, with maximum at 12.37 h ending at 13.29 h.7

Immediately after exposition the patient noticed vision loss and dark round spot, which decreased in following period and had finally gone completely.

The patient served in the army a few years later in infantry unit because he was partially capable for military service due to low vision.

We systematically excluded possible risk factors and other diseases of the macular area which can mimic the optical coherence tomography findings of solar retinopathy in the patient.

Two months later the best corrected visual acuity of the right eye was 0.7–0.8, and of the left eye 0.3 (Snellen). The findings on the anterior segment of the right eye were normal. Fundus examination of the right eye revealed oval interpapillomacular atrophic chorioretinal scar with pigmented margins, more pigmented nasally (Figure 1a).

On the left eye, in the macular region, atrophic chorioretinal scar of irregular shape was seen, indistinctively limited without pigmented margins (Figure 1b).

Amsler grid of both eyes showed metamorphopsia.

Optical coherence tomography of both eyes was done (Figure 2) (Topcon 3D OCT-1000) and its findings were as follows.

Right eye: in the foveola a few minor disruptions of the photoreceptors band, nasally from fovea, in the area of clinically significant alteration, a complete absence of photoreceptor band and several disruptions of the retinal pigment epithelium band were seen. Likewise, hyperreflective alteration was seen in the level of RPE-photoreceptor complex which corresponded with clinically seen hyperpigmentation (Figure 2, left). Central foveal thickness was 176 µm and total capacity 6.69 mm³ (according to Normative Database, Caucasian, Age group: 40–70 years Courtesy of Rotterdam Study).

Left eye: a few micro ablations of pigment retinal epithelium was present. In whole, foveal area major deficiencies and thinning of photoreceptor band with highly hypo-reflectivity of that layer were registered. Central foveal thickness was 91 µm and total capacity 6.69 mm³ (Figure 2, right).

![Fig. 1 – Fundus examination: (a) – on the right eye oval interpapillomacular atrophic chorioretinal scar with pigmented margins; (b) – atrophic chorioretinal scar of irregular shape in the macular region on the left eye](image1)

![Fig. 2 – Optical coherence tomography of both eyes](image2)
Discussion

Solar retinopathy refers to damage of outer retinal layers, retinal pigment epithelium and photoreceptor layer. Three types of retinal damage from intense light have been described: mechanical, thermal and photochemical damage, the last being the most probable mechanism in retinal damage caused by solar eclipse viewing 1, 3.

The clinical symptoms described in the literature include decreased vision, central scotoma, dyschromatopsia, photophobia and metamorphopsia (as in our patient). Although asymmetrical, involvement is usually bilateral. The degree of retinal damage depends directly on the intensity of light, duration of exposure, pupillary size (higher in case of total solar eclipse), transparency of ocular media (kids and younger persons are more liable), refractive state, with increased risk in emmetropes and low hypermetropes because the light is focused sharply on the macula 5.

No specific therapy exists for solar or eclipse retinopathy. Direct sun and eclipse viewing should be discouraged unless there is adequate use of the proper protective eyewear 1.

Optical coherence tomography findings in the presented patient with hypo-reflectivity of outer retina in the level of RPE-photoreceptor complex with peculiar atrophy and thinning of the foveal region, which is seen many years after solar eclipse viewing, corresponds to findings of other researchers 6, 8.

Conclusion

Optical coherence tomography findings may facilitate the diagnosis and estimate the degree and nature of macular damage in solar retinopathy. It can help in better diagnostic of solar retinopathy in correlation with anamnestic data and clinical symptoms and signs, especially in atypical cases.

REFERENCES


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