Case report

Solar retinal phototoxicity masquerading as self-inflicted handheld laser-induced lesions

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1. Introduction

Self-inflicted handheld laser-induced injuries have been initially reported in 1999 and since then, the number of reported cases is increasing. Self-inflicted lesions were more frequently reported in teenagers or young adults with psychiatric disorders. They were described as hyper-autofluorescent spots with a frequent appearance of vertical streaks. They were hyperfluorescent in late phases of both fluorescein angiography (FA) and indocyanine green angiography (ICGA). Hyper-reflective outer retina layers were observed on spectral-domain optical coherence tomography (SD-OCT). In previous reports, the use of handheld laser was frequently denied by the patients due to their psychiatric disorders. We report a case with similar lesions, for which self-inflicted injuries were suggested. However, they were due to the unprotected observation of the sun with an astronomical telescope.

2. Case report

A 44-year-old man consulted for a moderate visual loss in his left eye evolving for one year. He complained of a relative scotoma and a minor distortion. He was previously diagnosed with acute central serous chorioretinopathy (CSC) based on FA and OCT findings. Visual acuity was 20/40 in the left eye. FAF, infrared images and OCT were suggestive of chronic CSC based on alterations of the retinal pigment epithelium (RPE), with areas of small detachment of the RPE, in a context of pachychoroid. The central choroidal thickness was of 382 μm. OCTA showed dark areas and dark spots suggestive of the condition. The right eye was normal, but also showed a thick central choroid (362 μm).

Two months after this initial examination in our department, the patient consulted again for a severe visual loss that was perceived 3 days before. Visual acuity was 20/400. Color fundus pictures showed a yellowish foveal lesion (Fig. 1A). Infrared images showed numerous dots that were already present 2 months ago. FAF picture showed hyper-autofluorescent dots above the fovea, while the fovea itself...
Deep changes were seen on SD-OCT and OCTA (Fig. 2). SD-OCT showed hyper-reflective outer retina layers. OCTA showed a large area of capillary drop-out into and above the fovea. All these multimodal imaging techniques were highly suggestive of handheld laser pointer-induced lesions. However, the patient ruled out any incidental use of a laser pointer and denied any self-injury. He was questioned about his activities before the visual loss but he did not mention any abnormal activity. The patient had no past psychiatric history and did not show any sign that could suggest an abnormal psychic behaviour. Two days later, he called back because he reminded having practiced his usual astronomical observations. His main hobby was the observation of solar winds, sunspot groups and filaments that could be observed around the sun. The last astronomical observation was performed the day before the patient complained from visual loss, but the patient did not initially make any relation between the visual loss and the astronomical observation that he practices every week. He was asked to check his telescope. The main observation lens was equipped with a special filter, but the side ocular used for initially pointing the telescope had lost its protection. This side ocular could only be used by the left eye, while the main observation was made by the right eye.

We assumed that the patient used his left eye to point the telescope in the good direction. Because this eye has a relative central scotoma, the patient was not blurred enough to stop his observation, and the exposition to sunlight was probably long enough to develop a foveal sunburst.

3. Discussion

Retinal phototoxicity may occur after surgical illumination during eye surgery, due to endoscopes or microscopes, or after laser or sunlight exposure, especially after observing an eclipse. Handheld laser-induced injuries have recently been reported. Some lesions are very typical, including hyper-autofluorescent round dots showing a marked hyperfluorescence in the late phase of the angiogram, both on FA and ICGA. Unlike peer-injured lesions, self-induced injuries present another characteristic finding: a pattern of vertical streaks directed towards the upper part of the fovea. These lesions have a poor prognosis because of the anatomical destruction of the choriocapillaris and result in a permanent central scotoma and visual loss. Choroidal neovascularization may also complicate the lesion. Corticosteroids have been seldom used in order to minimize the inflammatory process around the lesions.

Solar maculopathy is usually observed after unprotected observation of a partial solar eclipse, but may also occur after voluntary observation of the sun that could occur in psychiatric disorders or religious practices. In these cases, exposure to sun is frequently denied by patients. The same problem may be observed after laser self-induced injuries. A psychiatric consultation may be needed in difficult cases. A psychiatric evaluation may also be needed in order to prevent other self-injuries. In children, the fear of punishments may also explain some denials. In the present case, we report very similar lesions that could be related to the observation of the sun, more precisely the halo around the sun, with an astronomical telescope. This could result from the loss of a protective filter and, the relatively low visual acuity in this eye probably prevented the patient from feeling any glare. We consider that the lesions were caused by the solar exposure for 3 reasons. First, the delay between the 2 consecutive examinations was only 2 months. Appearance of so huge CSC changes during this short period is unlikely. Second, the causative exposure to the sunburst occurred the day before the patient complained from visual loss. Third, the lesions were very similar to macular burns due to laser pointers, but the patient was an adult, without any psychiatric trouble, and no present or past-history of other self-injurious lesions.

The relationship between CSC lesions and the photic maculopathy remains questionable. It is known that chronic CSC may alter the retinal pigment epithelium, giving a pattern of diffuse retinal epitheliopathy. CSC can also interact with iatrogenic exposures, such as tamoxifen.

Fig. 1. Multimodal imaging of retinal phototoxicity induced by the unprotected observation of the sun with an astronomical telescope. Color photograph (A), fundus autofluorescence (B), late phase of fluorescein angiography (FA, C) and of indocyanine green angiography (ICGA, D). Yellowish appearance of the fovea and the retina above the fovea (A). Uneven autofluorescence of the fovea due to the underlying central serous chorioretinopathy, but presence of hyper-auto-fluorescent spots above the fovea (arrows, B). These spots appeared hyper-fluorescent in the late phase of FA, with some leakage (C). The fovea itself and the spots also appeared hyperfluorescent in the late phase of ICGA (D). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Fig. 2. Comparison of horizontal B-scans of spectral-domain optical coherence tomography (SD-OCT, A, C) and OCT-angiography (OCTA) with a slab at the level of the choriocapillaris (B, D), 2 months before (A,B), and one week after the astronomical observation (C,D). A pachychoroid was initially present (A). A hyper-reflectivity of the outer retina occurred after the sunburst (arrow, C). OCTA also showed marked changes, with a very dark area (arrows) that could be due to the sunburst.
retinopathy, acting as an aggravating factor of both conditions. We cannot rule out that presence of macular lesions of CSC increased the consequences of the solar exposure, in addition with absence of glare perception.

In conclusion, the unprotected observation of the sun with an astronomical telescope should thus be known as a possible differential diagnosis of self-inflicted handheld laser-induced injury.

Patient consent

Written informed consent was obtained from patients for publication of these case reports and any accompanying images.

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Authorship

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Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaoc.2019.100578.

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