LASER TOY RETINAL BURN AND MACULAR DYSTROPHY SIMILARITIES

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Abstract: *Laser pointer damage in children can occasionally be misdiagnosed as a macular dystrophy disease. Our objective is to present the macular phenotypes associated with laser buns. We present the case of a 14-year-old boy with bilateral blurred vision, without known personal or family history, after deliberately staring into a laser beam. The fundus examination describes a hypopigmented round-shaped foveal lesion. The optical coherence topography showed a retinal pigment epithelial change in the both eyes. Loss of retinal function due to laser pointer injury has increased over the years, thus making the recognition of characteristic paramount.*

INTRODUCTION

Most macular dystrophies have similar clinical features that consist in accumulated yellowish material in the macular region. It is emphasized that the course of each disease is quite different, thus making mandatory the clear differentiation.(1,2,3,4)

Laser pointers are low energy lasers with output power between 1 and 5 mW; this technology is evolving and it is known that the products are becoming cheaper.(1,5) The parameters determine the type of retinal damage. The burn mechanism may be thermal, mechanical or photochemical (1) There are just a few reports of retinal damage caused by these pointers, thus the exact injury mechanism is not clear.(1,6)

The retinal impairment varies from subtle lesion to extensive hemorrhage and disruption of the retina.(1) Nevertheless, the damages are expressed as transient visual loss and macular retinal pigment epithelium disturbance that translates into a window defect, hyperfluorescence on fluorescein angiography.(1)

An important role in the retinal damage extent is being played by factors such as: patient age, blink response, pupil size, preexisting maculopathy, clarity of ocular media, and the proximity of the laser beam to the fovea.(1,5)

Visual recovery is variable, depending on the lesions localization and the extent of the injury.(1)

The treatment for these retinal laser injuries is still uncertain; studies present the beneficial effect of corticosteroid treatment.(1,5)

PURPOSE

Our objective is to present the macular phenotypes associated with laser buns.

CASE REPORT

We present the case of a 14-year-old boy who displayed a history of blurred vision, with no notable personal previous ocular comorbidities, active life and without any remarkable family history.

Apparently, the disease began in early November 2015 with acute, prolonged blurred vision, consequently the family consulted an ophthalmology cabinet. The fundus examination and the optical coherence tomography showed a subfoveolar irregular retinal pigment epithelium disruption with the photoreceptor layer intact. Macular dystrophy suspicion was raised.

The boy consulted the ophthalmology department on the 2nd of December 2015, with the persistence of the hazy vision.

From the ophthalmological examination we emphasized on the best-corrected Snellen acuity that was 5/5 in both eyes, the refraction: -0.5 DSh -0.5 -Dcyl ax3º for the right eye and -0.25 DSh -0.5 -Dcyl ax4º for the left eye, intraocular pressure (Goldman tonometry): 17-17 mmHg and the fore segment evaluation was within the normal range, without pupillary defects.

The fundus examination showed a normal optic nerve head and a vitelliform like maculopathy in both eyes,with gray and yellowish round spots in the foveal area (figure no. 1).

For the certainty of the diagnosis, ancillary tests were performed (we present only the relevant tests):

1. The computerized perimetry showed a small paracentral scotoma in the right eye;
2. The optical coherence tomography showed changes of the retinal pigment epithelium, with disruption of the external limiting membrane (figure no. 2);
3. The fundus fluorescein angiography revealed subtle changes with hypoautofluorescence dots in the fovea of both eyes (two in the right eye and one in the left), thus concluding that there is a pigment epithelium defect (figure no. 3);
4. Despite severe focal damage to the central retina visible fundoscopically and with optical coherence tomography, all electrophysiological examinations were quantitatively normal. (electroretinogram, electrooculogram)

Differential diagnosis

We were searching for macular dystrophies such as: Best's disease and vitelliform dystrophy, Cone dystrophy, Stargardt's disease and fundus flavimaculatus, Pattern dystrophy.

Best's disease is characterized by a yolk-like lesion,

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being bilateral and symmetrical in the macula, appearing during childhood; although the phenotype of the disease makes it easy to recognize, the abnormal electroocular findings help the diagnosis (Arden ratio under 14%).(1,3,4,5) This diagnosis was excluded due to the normal electro-oculogram from our case. Pattern dystrophy, phenotypes take more than one characteristic patterns, thus some have the acquired name of butterfly dystrophy (pigment deposited that radiates in the pattern of butterfly wings).In this case, the electrophysiological testing is initially normal.(1,2,7) We excluded this diagnosis due to the macular phenotype which was not characteristic.

Stargardt's disease, inherited autosomal recessive features, characterized by "pisciform" flecks at the retinal pigment epithelium that evolves into a "beaten bronze" macula. The most characteristic finding is the "dark" choroid on the angiography.(1,2) Our angiofluorography findings excluded this possibility. Cone degeneration is the degeneration of cone photoreceptor cells being gender-linked and characterized by the triad: visual acuity loss, color vision disturbance and photophobia. The electroretinogram defines the diagnosis through the diminution of photopic "B" wave.(1,2) The absence of this triad defined our diagnosis.We also excluded diagnostics that appear later in life, or are specific for particular regions, such as: Sorsby macular dystrophy (mid 40s), North Carolina macular dystrophy, Atrophia areata (Icelandic region).(1,2)

Due to the macular phenotype, we opted for Best's disease diagnosis, thus proceeding in examining the family, which included a smaller sister.

After extensive questioning and examination, the child admitted that his sister pointed a laser beam directly into his eye the day before the ocular symptoms started. We were not able to examine the laser device responsible for the injury. Taking into consideration our later findings we established the final diagnosis: macular burn due to laser toy, diagnosis that explained all of our findings.

We reviewed similar cases of macular burns due to laser toys, the retinal characteristics being kindred with the current case. Photoreceptor damage was present in all cases reviewed and optical coherence tomography monitoring showing recovery over time.(5,6,8,9)

Treatment and outcome

We decided that a close monitoring is sufficient along with the reassessment of the optical coherence tomography within six months.Optical coherence tomography showed partial resolution of the outer retinal disruption noted on his initial visit, presenting persistent, small foveal photoreceptor defects in both eyes, and the visual acuity stayed the same.

Figure no. 1.a. Fundus photography

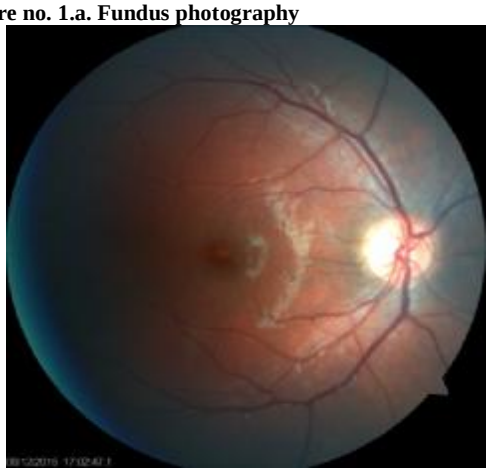
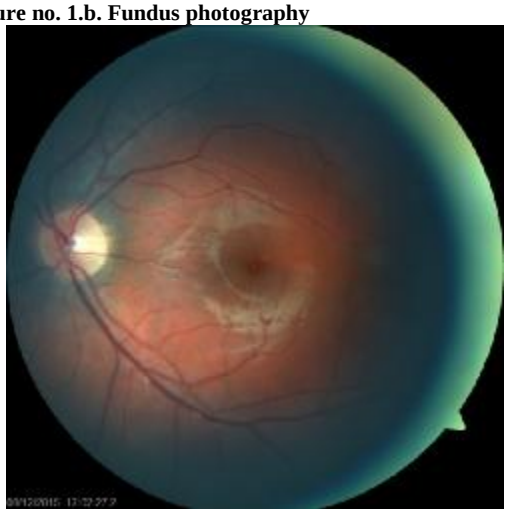


Figure no. 1.b. Fundus photography



Optical coherence tomography showed partial resolution of the outer retinal disruption noted on his initial visit with persistent, small foveal photoreceptor defects in both eyes, and the visual acuity stayed the same.

Figure no. 2. Optical coherence topography

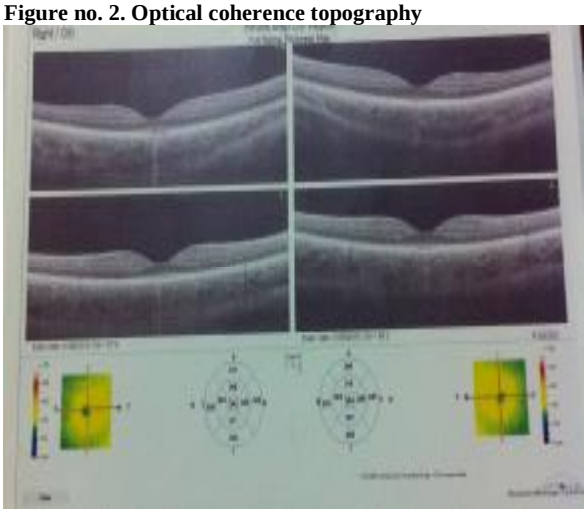


Figure no. 3. a. Flourescein angyography

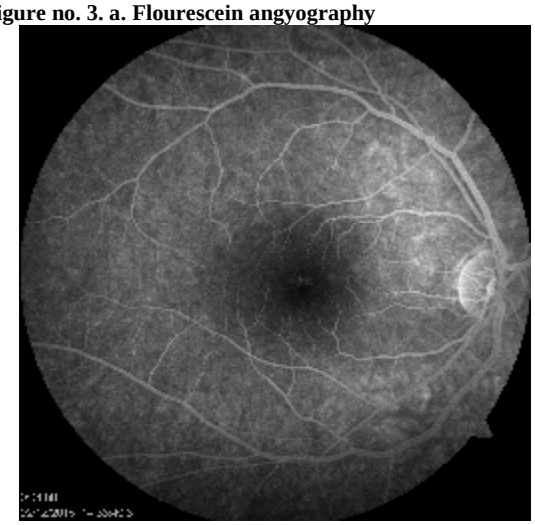
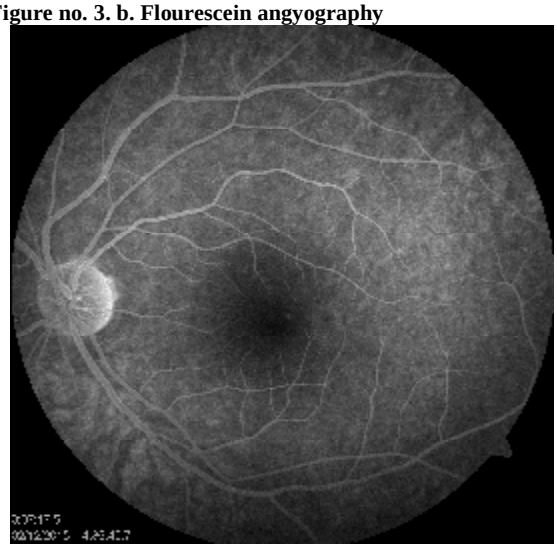


Figure no. 3. b. Flourescein angyography



CONCLUSIONS

There is a potential misuse of lasers toys and a dangerous ocular exposure.(1,5,6) The characteristic recognition of laser-induced lesions is paramount as the presence of laser pointer has been increasing over the years.(6) It may be difficult to assess the safety of laser toys.(5)

In general, OCT are quite useful to diagnose laser damage.(4,8,9)

A possible aggravating factor should be considered exposure to non-visible radiation.(10)

Learning point: We wish to raise awareness of this potential macular pathology, which implies a difficult diagnosis. Laser pointer damage among children can occasionally be misdiagnosed as a macular dystrophy disease.(8)

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