Anti-VEGF Treatment for Bilateral Choroidal Neovascularization Secondary to Laser Pointer Injury in a Child: Case Report

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Dear Editor,

Laser pointers are low-energy light sources that emit focal non-ionizing radiation and are commonly used in medicine, industry, and entertainment.[1,2] In recent years, laser pointer-induced retinal injuries have increased, particularly among children.[3]

This article describes a 7-year-old patient with bilateral laser-maculopathy who showed rapid progression of type 2 choroidal neovascularization (CNV) in the right eye (RE) and suspected CNV in the left eye (LE) after accidental exposure to a class 3R handheld laser pointer. This case emphasizes the importance of recognizing the development of choroidal vascularization following laser pointer-induced maculopathy.

A healthy 7-year-old boy presented to our clinic with blurred vision in both eyes after playing with a laser pointer the day before. On examination, best corrected visual acuity (BCVA) was 20/40 in the RE and counting fingers at 30 cm in the LE. Anterior segment examination was unremarkable in both eyes. Fundus examination revealed two juxtafoveal yellowish-gray spots in the RE and an elevated hemorrhagic foveal lesion in the LE (Figure 1a, b). Spectral domain optical coherence tomography (SD-OCT) revealed no pathological findings in the RE but showed a discrete hyperreflective lesion beneath the fovea and an intraretinal cyst in the LE (Figure 1c, d). OCTA displayed normal findings on all slabs in the RE and a black shadow from the blocking effect of the hemorrhage in the LE (Figure 1e, f). Fundus fluorescein angiography (FFA) showed hyperfluorescent staining of the two juxtafoveal spots in the RE and normal findings in the LE (Figure 1g, h).

Under general anesthesia, an early sub-Tenon injection of triamcinolone acetonide (40 mg/mL; Kenacort-A 40®, Bristol-Myers Squibb, Anagni, Italy) was administered in both eyes. Topical nepafenac 0.1% (Apfecto®, Bilim Pharmaceuticals, İstanbul, Türkiye) and oral ibuprofen syrup (İbufen®, Sanofi Pharmaceuticals, İstanbul, Türkiye) were also prescribed. After 5 days, BCVA improved to 20/25 in the RE and 20/125 in the LE. On day 6, SD-OCT revealed a new foveal ellipsoid zone defect in the RE, along with regression of the hyperreflective lesion and a decrease in central macular thickness in the LE.

At 2-week follow-up, BCVA in the RE had decreased to 20/50 and remained unchanged in the LE. Fundus examination revealed a new elevated lesion in the foveal area besides the two juxtafoveal yellowish spots in the RE and a persistent elevated hemorrhagic foveal lesion in the LE, arousing suspicion of CNV. SD-OCT showed the presence of intraretinal and subretinal fluid in the RE, along with the persistent hyperreflective lesion in the LE (Figure 2a, b). The outer retinal slab of OCTA depicted CNV in the RE and a prominent black shadow in the LE (Figure 2c, d). FFA revealed early hyperfluorescence of the lacy network indicating type 2 CNV in the RE, while no leakage was observed in the LE (Figure 2e, f).

The patient received consecutive monthly intravitreal injections of 1 mg aflibercept (Eylea®, Bayer AG, Berlin, Germany) three times in both eyes under general anesthesia. Within one month, regression of the CNV in the RE was observed, accompanied by an improvement in BCVA up to 20/25 in both eyes. Subsequent follow-up SD-OCT revealed the presence of juxtafoveal scar tissue without exudation in the RE and almost complete regression of the hyperreflective lesion

Keywords: Laser pointer, maculopathy, choroidal neovascularization, anti-VEGF, pediatric retinal injury, SD-OCT, OCTA, sub-tenon steroid injection, retinal imaging

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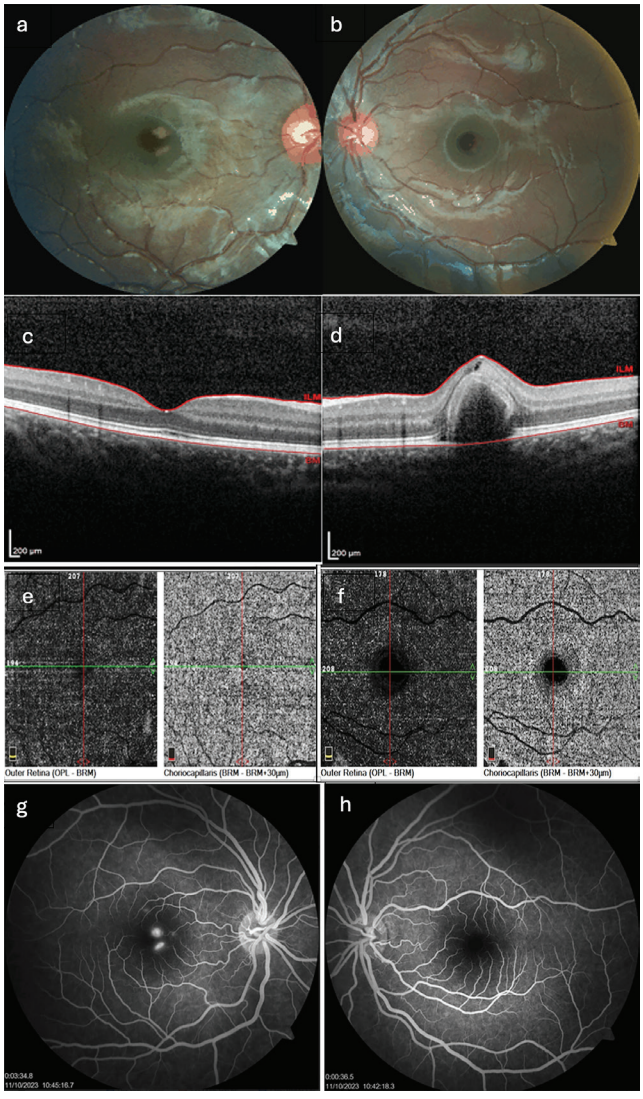

Figure 1. Dilated fundus examination revealed two juxtafoveal yellowish-gray spots in the right eye (RE) (a) and an elevated hemorrhagic foveal lesion in the left eye (LE) (b). While SD-OCT demonstrated no pathological findings in the RE (c), it revealed a discrete hyperreflective lesion beneath the fovea, disruption of the outer retina, loss of the ellipsoid zone, and an intraretinal cyst in the LE (d). OCTA depicted normal findings on all slabs in the RE (e) and a black shadow from the blocking effect of the hemorrhage on the outer retinal and choriocapillaris slabs in the LE (f). FFA showed hyperfluorescent staining of the two juxtafoveal spots in the RE (g) and normal findings in the LE (h)
SD-OCT: Spectral domain optical coherence tomography, OCTA: OCT angiography, FFA: Fundus fluorescein angiography

suspected to be CNV in the LE (Figure 3a, b). OCTA depicted a change from a dense to a loose configuration of CNV on outer retinal slabs in the RE, while normal findings were observed on all slabs in the LE. Fundus examination revealed regression of the elevated foveal lesion in both eyes after the monthly intravitreal injections (Figure 3c, d).

Laser devices are classified based on their power output, with class III and IV lasers (>1 mW) posing significant risks to the

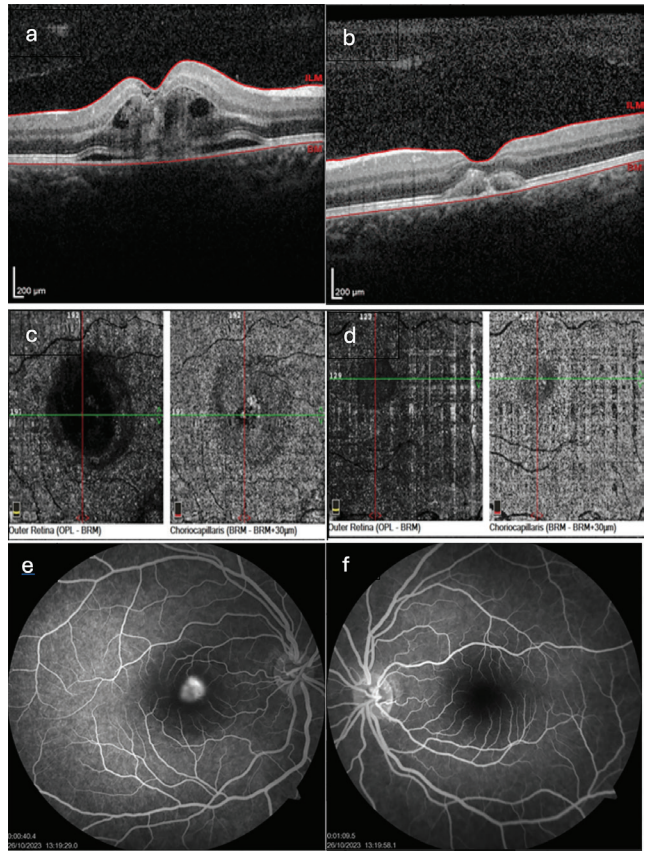

Figure 2. SD-OCT revealed intraretinal and subretinal fluid in the right eye (RE) (a), persistent hyperreflective lesion in the left eye (LE) (b). The outer retinal slab of OCTA depicted CNV with a dark halo in the RE (c) and a prominent black shadow in the LE (d). FFA unveiled early hyperfluorescence of the lacy network indicating type 2 CNV formation in the RE (e), while normal findings were observed in the LE (f)
SD-OCT: Spectral domain optical coherence tomography, OCTA: OCT angiography, CNV: Choroidal neovascularization, FFA: Fundus fluorescein angiography

retina.[4] In recent years, laser pointer–associated retinal injuries have increased due to misclassified devices often marketed as toys.[5] Children and other vulnerable groups are at particularly high risk of irreversible ocular damage.[4] This case highlights the potential for bilateral retinal injury from class 3R pointers and the value of multimodal imaging. Swept-source OCT studies, such as that conducted by Moussa et al.[6], further expanded the understanding of the clinical spectrum of laser pointer maculopathy.

Currently, no consensus exists regarding treatment of laser-induced retinal injuries. Some reports describe improved OCT findings and BCVA after systemic steroid use, while experimental studies suggest non-steroidal anti-inflammatory drugs (NSAIDs) may enhance photoreceptor survival following argon laser injury.[7,8] However, randomized trials have not demonstrated clear benefits for either treatment. Early sub-Tenon steroid injection has been proposed as a means of achieving rapid visual recovery while minimizing systemic effects.[9] In our patient,

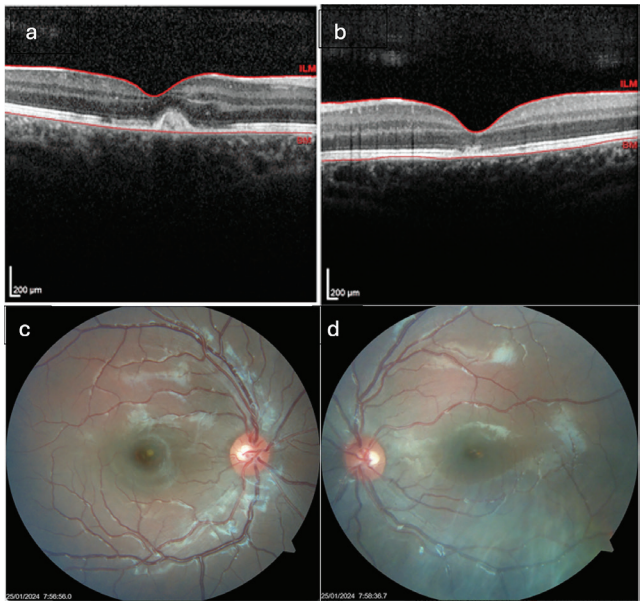

Figure 3. SD-OCT showed juxtafoveal scar tissue without exudation after three anti-VEGF injections in the right eye (a) and almost complete regression of the hyperreflective lesion with recovery of the outer retina after two anti-VEGF injections in the left eye (b). Dilated fundus examination revealed regression of the elevated foveal lesion in both eyes (c, d)
SD-OCT: Spectral domain optical coherence tomography, VEGF: Vascular endothelial growth factor

this approach combined with topical and oral NSAIDs led to temporary structural and functional improvement. Nonetheless, CNV developed in the RE within two weeks, and complete regression of the retinal injury in the LE could not be achieved with steroids alone.

Anti-vascular endothelial growth factor (anti-VEGF) therapy has emerged as the most effective strategy for CNV secondary to laser pointer injury.[2] Case reports have shown either complete CNV resolution or significant visual recovery in young patients, sometimes after only a single injection.[10] Consistent with this, our patient received three monthly intravitreal injections in the RE, resulting in full CNV inactivation and rapid functional recovery, with no recurrence during follow-up. In the LE, where hemorrhage obscured imaging but CNV was suspected, anti-VEGF therapy under general anesthesia also achieved favorable outcomes.

In summary, while steroids and NSAIDs may provide early structural improvement, they appear insufficient to prevent CNV. Anti-VEGF therapy remains the cornerstone in managing neovascular complications of laser pointer injuries. Given the rising incidence of such injuries, especially among children, stricter regulation of handheld lasers and public education are urgently needed. Early recognition and timely anti-VEGF treatment offer the best chance for preserving long-term vision.

Ethics

Informed Consent: Written consent was obtained from the parent of the patient.

Declarations

Authorship Contributions

Surgical and Medical Practices: S.A.B., G.G., Concept: S.A.B., S.E.G., Design: G.Y., S.A.B., S.E.G., Data Collection or Processing: S.E.G., G.G., Analysis or Interpretation: G.Y., S.E.G., Literature Search: S.E.G., Writing: S.E.G.

Conflict of Interest: No conflict of interest was declared by the authors.

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