• Letter to the Editor •

Formation of choroidal neovascularization under macular fovea after high-power laser irradiation: a case report

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Dear Editor,

I am Dr. Shan-Shan Li, from Northern Jiangsu People's Hospital, Yangzhou, China. I write to present the case of formation of choroidal neovascularization (CNV) under the fovea after high-power laser irradiation.

Currently, there is an increasing availability and accessibility to laser instruments, but improper use of these tools can lead to macular damage and irreversible visual impairment. There are very few reports regarding CNV formation caused directly due to laser damage. We herein report a patient with CNV formation under the fovea after high-power laser irradiation.

Ethical Approval This study followed the tenets of the Declaration of Helsinki and was approved by Northern Jiangsu People's Hospital. Written informed consent was obtained from the participant.

A 26-year-old male patient presented to our hospital on February 21, 2017 due to "visual impairment in the right eye with metamorphopsia". Ten days before the admission, his right eye was accidentally irradiated by a high-power laser instrument (power 195 W) while working without wearing a protective goggle. On day 2 after irradiation, the patient reported visual impairment with metamorphopsia. There was no previous history of high myopia or family history of genetic diseases. Best-corrected visual acuity (BCVA) revealed 0.9 logMAR for the right eye and 0.0 logMAR for the left eye. The anterior segment of both eyes was unremarkable, and the lens and the vitreous body were both clear. Fundus examination revealed subretinal hemorrhage and exudative lesions in the macular area of the right eye, with peripheral retinal edema (Figure 1A). The retina of left eye was unremarkable. Fluorescein angiography (FFA) showed a hyperfluorescence lesion in the fovea of the right eye, surrounded by low fluorescence, and over time, a gradual leakage occurred. The hyperfluorescence lesion was still present in the late stage (Figure 1B). Optical coherence tomography (OCT) showed a hyperreflective subfovea lesion with a small neuroepithelial detachment (Figure 1C). Systemic investigations for infective diseases was negative. The CNV of the right eye was considered to be induced by laser irradiation. On February 28, 2017, intravitreal injection of conbercept (10 mg/mL, 0.5 mg; KH902; Chengdu Kanghong Biotech Co. Ltd., Sichuan, China) was administered in the right eye. Reexamination was performed 15d after the injection, BCVA of the right eye revealed 0.2 logMAR, and the retinal anatomy in the macular area showed significant improvement. The subretinal hemorrhage on fundus examination was decreased (Figure 2A). OCT showed that the hyperreflective subfoveal lesion was significantly reduced, and the neuroepithelial edema was improved (Figure 2B). After 2y of follow-up, the conditions of the right eye remained stable, BCVA was 0.0 logMAR and CNV showed no recurrence (Figure 3), and no other eye complications occurred.

DISCUSSION

Macular damages caused by laser include pigment disorder in the outer layer of the macula, macular hemorrhage, macular hole, macular epiretinal membrane, CNV[1-3]. The 3 most important variables in the occurrence of macular damage due to laser included: laser power, irradiation time, and the location of retinal involvement[4]. High-energy lasers cause Bruch's membrane rupture. According to Cui *et al*[5], CNV appears after 7d in the experimental model of krypton laser-induced CNV in rats. Fukushima *et al*[6] reported that CNV formation was induced in monkeys within 1-2wk after krypton laser irradiation. However, there is a difference in the formation time of CNV between animals and humans. Kuhn *et al*[7] reported a case with accidentally injured eye by industrial YAG laser, and FFA confirmed CNV formation 16d after the injury. Sun *et al*[8] reported that in one patient with accidentally injured eye due to laser, CNV formed after 5d. Marcus *et al*[9] also reported

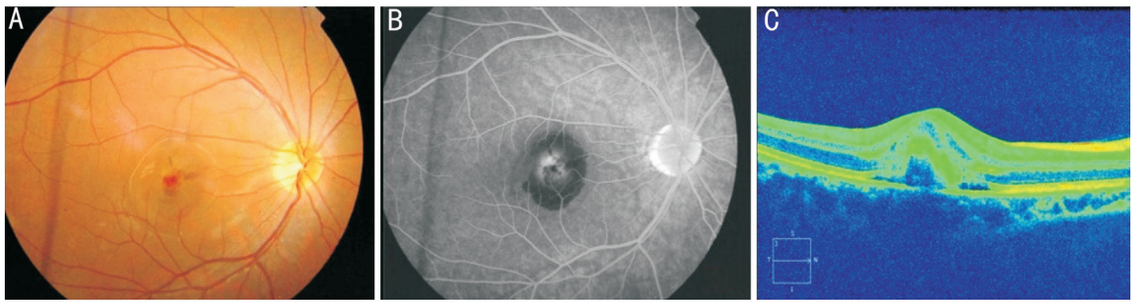

Figure 1 Ten days after laser irradiation of the right eye A: Fundus examination revealed subretinal hemorrhage and exudative lesions in the macular area, with peripheral retinal edema; B: FFA suggested hyperfluorescence lesion in the fovea, surrounded by low fluorescence; C: OCT showed hyperreflective subfovea lesion with a small neuroepithelial detachment.

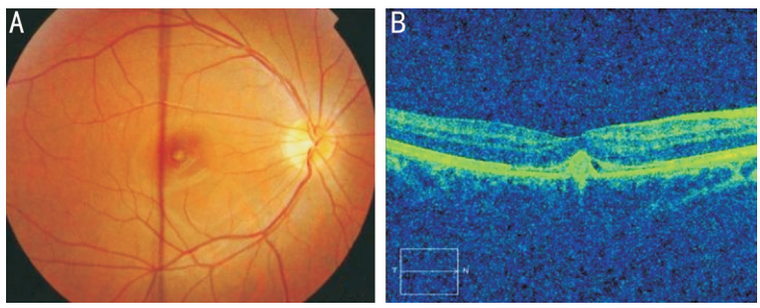

Figure 2 Fifteen days after intravitreal injection of conbercept A: Fundus examination revealed the subretinal hemorrhage was decreased; B: OCT showed the hyperreflective subfoveal lesion was significantly reduced.

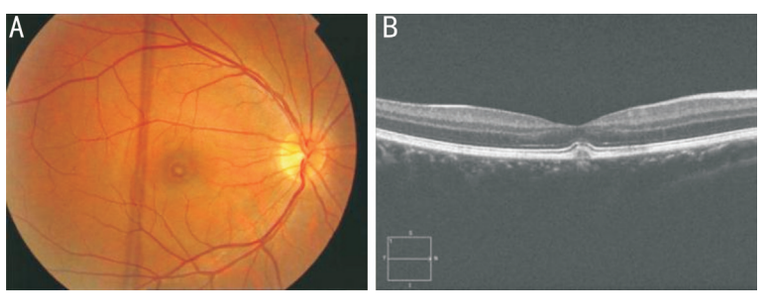

Figure 3 After 2y of follow-up, the lesion was reduced in the macular area.

a patient with macular choroidal rupture with macular hole and CNV formation 6mo after YAG laser injury. In the present report, the patient developed a CNV 10d after high-power laser irradiation.

CNV caused by the laser demonstrated a poor prognosis. Till date, intravitreal injection of anti-VEGF drugs is considered to be an effective treatment for maintaining vision stability. Fujinami *et al*[10] reported a 11-year-old boy with CNV caused by green laser pointer injury. No trearment was given to him because he was too young and also suffered from mental illness. During the 3y of follow-up, the CNV and BCVA (6/30) showed unchanged. Sun *et al*[8] reported a 22-year-old female with CNV formation caused by green laser light beam (more than 20 mW). The patient only took medications containing vitamin E and vitamin B6 for 1mo, and the CNV lesion gradually enlarged, with a final visual acuity of 0.01 after 1y. Xu *et al*[11] reported a 12-year-old boy with CNV resulted from laser pointer injury. His visual acuity showed improvement from 20/70 to 20/20 after one intravitreal injection of bevacizumab. There was no recurrence observed after 1y of follow-up. Forshaw *et al*[12] reported a case of CNV caused by laser pointer injury. The patient underwent intravitreal injection of ranibizumab but the lesion recurred 8wk later. Subsequently, the intravitreal injection of ranibizumab was administered again, and there was no recurrence during the 4y of follow-up. The above cases indicate that intravitreal injection of anti-VEGF drug is effective for CNV induced by low-power laser. In the present case report, after intravitreal injection of anti-VEGF drug, the CNV subsided and the retinal thickness decreased. After 2y of follow-up, BCVA showed improvement from 0.9 logMAR to 0.0 logMAR and the CNV didn't recur. The OCT image (Figure 3) showed the external limiting and ellipsoid zone above the residue scar of the CNV almost recovered, correlating to good central vision. But the last follow-up did not perform microperimetry, which could test functional damage in foveal area in details. This is a

shortcoming of the case report. This case report demonstrated that early treatment with anti-VEGF drug is effective for CNV caused by high-power laser (power 195 W). The American National Standard Institute has classified lasers with an output power of more than 5 mW to be potentially damaging to the eye and those with an output power of more than 500 mW to be capable of producing severe ocular damage[13]. Since high-power laser may cause severe ocular damage, we should treat CNV caused by high-power laser early.

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Conflicts of Interest: Li SS, None; **Chu XR,** None; **Chen F,** None.

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