Clinical Case Report

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Foveal choroidal neovascularization secondary to accidental laser exposure in a dermatologist

A case report

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Abstract

Rationale: Most laser-induced retinal injuries are caused by accidental laser discharge during the preparation of laser devices without protective goggles, laser injury during the cosmetic procedure in a dermatologist, is very rare, with no prior case reports.

Patient concerns: A 55-year-old Asian male dermatologist visited our hospital with a 2-week history of visual disturbance in his right eye. He had experienced sudden central scotoma in the right eye while using a Q-switched Nd:YAG laser (1064 nm, 2 J/cm^2, 6-mm spot size, 750 ps) 2 to 3 cm from the target without proper eye protection. He had applied a glass slide firmly onto the treatment area prior to commencing the procedure. The choroidal neovascularization (CNV) was detected via optical coherence tomography angiography (OCTA) 2 weeks after the laser injury.

Diagnosis: Foveal CNV secondary to laser energy reflected from the glass slide.

Intervention: Intravitreal bevacizumab (1.25 mg/0.05 mL) injection was performed.

Outcomes: Regression of CNV was observed.

Lessons: Retinal injury can occur not only by direct laser beam exposure but also by way of a beam reflected from a glass slide. Operators should always use laser safety eyewear during cosmetic procedures involving laser devices, so as to prevent the occurrence of ocular complications. Thorough short-term follow-up with OCTA is recommended for the prompt detection of CNV in cases of retinal laser injury.

Abbreviations: BCVA = best corrected visual acuity, CNV = choroidal neovascularization, OCTA = optical coherence tomography angiography.

Keywords: case report, choroidal neovascularization, fovea, laser, retina

1. Introduction

Various wavelengths of laser light can damage the eye. Wavelengths between 400 and 1400 nm can damage the retina, as they can be transmitted through the clear media of the eye.[1,2] Most laser-induced retinal injuries are caused by accidental laser discharge during the preparation of laser devices without protective eyewear.[3,4] Herein, we describe a case of foveal choroidal neovascularization (CNV) that developed within 2 weeks after accidental laser exposure in a dermatologist.

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2. Case report

A 55-year-old Asian male dermatologist visited our hospital within 2 weeks of developing visual disturbance in his right eye. He had experienced sudden central scotoma in the right eye while using a picosecond pulse duration Q-switched Nd:YAG laser (enlighten; Cutera Inc, Brisbane, CA) to treat a depressed scar on a patient's nose without proper eye protection. The laser settings were 2 J/cm^2 power, 6-mm spot size, 1064-nm wavelength, and 750-ps pulse duration, and it was fired at a distance of 2 to 3 cm from the target with a microlens array attached to the handpiece. The dermatologist had applied a glass slide firmly onto his patient's treatment area to reduce the pain and decrease epidermal damage during the procedure.

On ocular examination, best corrected visual acuity (BCVA) was 4/32 in the right eye and 20/20 in the left (Snellen chart). Dilated fundus examination was normal in the left eye, but the right eye exhibited an area of intraretinal and subretinal hemorrhaging of approximately 3/4 disc diameter in size on the macula, with elevated retina (Fig. 1A). Optical coherence tomography angiography (OCTA; DRI OCT Triton; Topcon, Tokyo, Japan) revealed mild subretinal fluid and CNV with disruption of the retinal pigment epithelium, ellipsoid zone, and outer retina. Angiography depicted a "Medusa head" appearance of the CNV in the outer retinal layer (Fig. 1B, C). Fluorescein angiography (HRA-2; Heidelberg Engineering, Dossenheim, Germany) depicted mild hyperfluorescence in the arteriovenous phase (Fig. 2A) and leakage in the late phase around the fovea (Fig. 2B). An intravitreal bevacizumab injection (1.25 mg/0.05 mL) was administered,

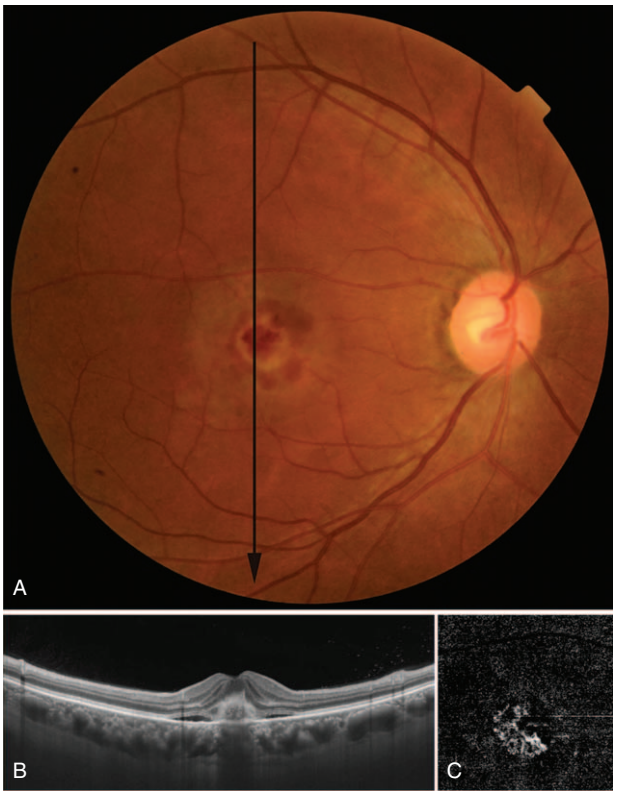

Figure 1. Initial examinations of the right eye. (A) Fundus photography revealed an intraretinal and subretinal area of hemorrhaging of approximately 3/4 disc diameter in size on the macula, with elevated retina. Arrow represents the optical coherence tomography section obtained through the fovea and the direction of the scan. (B) Optical coherence tomography revealed choroidal neovascularization with disruption of the retinal pigment epithelium, ellipsoid zone, and outer-retina, and mild subretinal fluid. (C) Optical coherence tomography angiography of the outer retina depicted choroidal neovascularization with a "Medusa head" appearance.

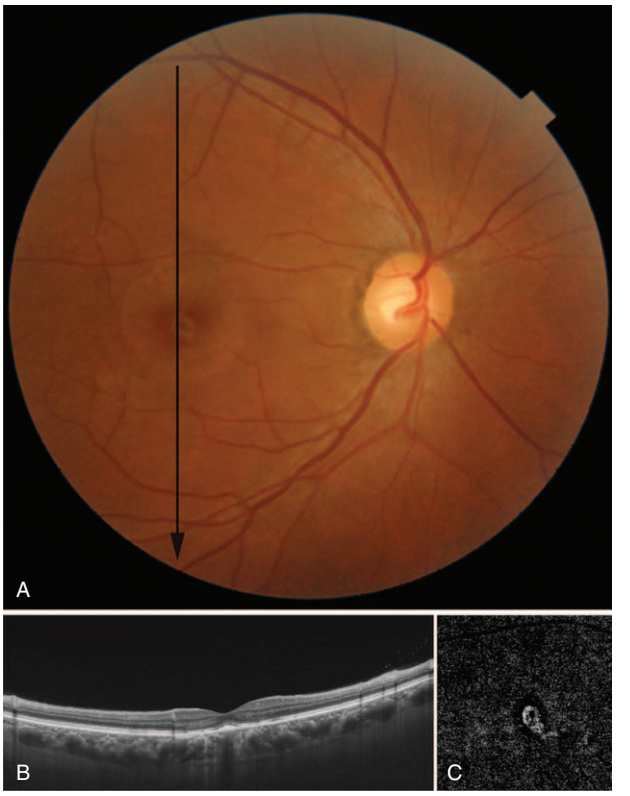

Figure 3. Examinations of the right eye 12 weeks after 2 intravitreal bevacizumab injections (1.25 mg/0.05 mL). (A) Fundus photography revealed a flattened retina with resolution of intraretinal and subretinal hemorrhaging. Arrow represents the optical coherence tomography section obtained through the fovea and the direction of the scan. (B) Optical coherence tomography revealed improvement of subretinal fluid and regression of choroidal neovascularization. (C) Optical coherence tomography angiography of the outer retina revealed reduction in the size of choroidal neovascularization.

followed by a 2nd injection 4 weeks later. Twelve weeks thereafter, BCVA had improved to 20/80 and fundus examination revealed a flattened retina with resolution of the intraretinal and subretinal hemorrhaging in the right eye (Fig. 3A). OCTA revealed improvement of subretinal fluid and reduction in the size of the CNV (Fig. 3B, C). Close monitoring of BCVA changes and CNV

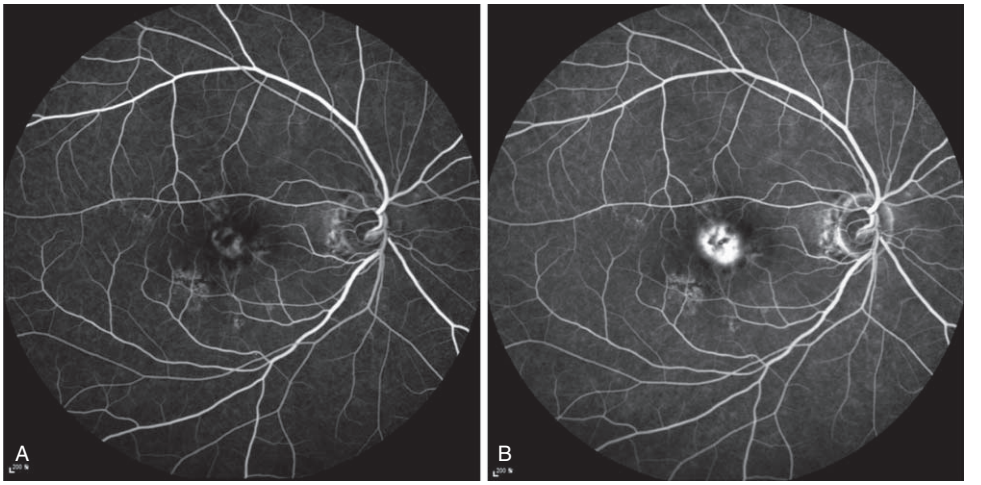

Figure 2. Initial fluorescein angiography in the right eye. (A) Mild hyperfluorescence was visible around the fovea in the arteriovenous phase (46 seconds). (B) Fluorescein leakage was visible in the late phase (5 minutes 18 seconds).

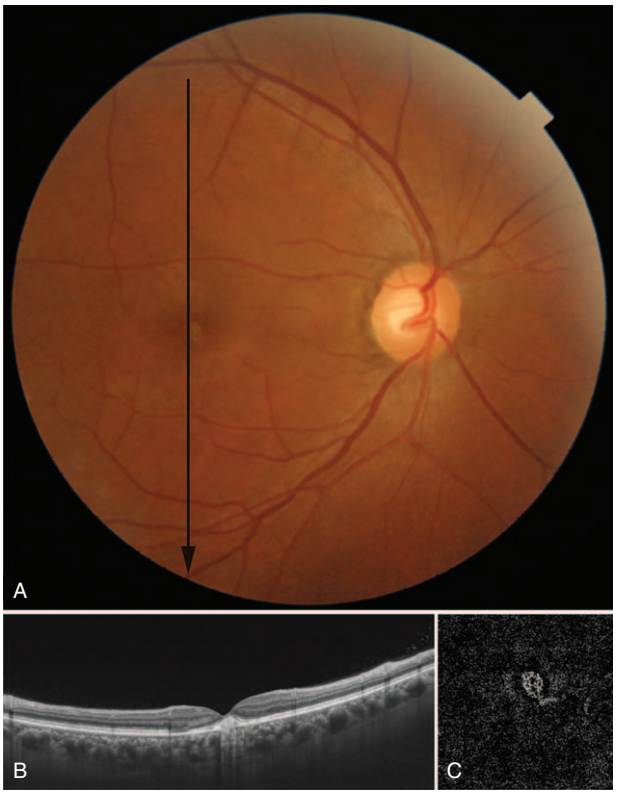

Figure 4. Examinations of the right eye 4 months after 2 intravitreal bevacizumab injections (1.25 mg/0.05 mL). (A) Fundus photography observations were similar to those of 12 weeks after 2 intravitreal bevacizumab injections. Arrow represents the optical coherence tomography section obtained through the fovea and the direction of the scan. (B) Optical coherence tomography revealed aggravation of choroidal neovascularization. (C) Optical coherence tomography angiography of the outer retina revealed increased choroidal neovascularization size with extensive arborization.

progression was scheduled. At 4 months after the 2nd intravitreal injection, his right eye BCVA was 20/63 and fundus findings were similar to those of the previous visit (Fig. 4A). However, OCTA revealed an increase in the size of the CNV with extensive arborization (Fig. 4B, C). The patient was treated with another intravitreal bevacizumab injection. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

3. Discussion

Laser-induced ocular injuries have become more common as lasers have become more widely used in many different fields, such as cosmetic medicine, scientific research, and industry.[5] The eye can be injured during cosmetic laser procedures involving the face, and most such injuries are reportedly associated with improper eye protection of the patients receiving laser treatments.[6] To date, there are few reports pertaining to injury to the operator during cosmetic laser procedures.

In the present case of foveal CNV secondary to accidental laser exposure in a dermatologist, he was not looking directly at the laser source. The vision loss occurred during a scar removal procedure he was administering without proper eye protection, and the circumstances at the time (specifically, the presence of a glass slide) suggest that reflection of the laser caused foveal damage and resulted in the development of secondary CNV. All Q-switched Nd:YAG lasers are Class IV, which means they incorporate a direct beam, and specular reflection and diffused reflection are hazardous to the eye.[7] Wang et al reported a patient who suffered CNV secondary to exposure to an Alexandrite laser (750 nm, 5–80 milliseconds pulse duration).[3] The laser used in the present case was a Q-switched Nd:YAG with a 1064-nm wavelength and 750-picosecond pulse duration. Higher wavelengths and shorter pulse durations cause more severe mechanical damage to the retina.[5]

In the present study, laser energy reflected off a glass slide into the operator's eye, and damaged the retina. CNV developed within 2 weeks, which is rapid compared to other secondary CNV causes such as traumatic choroidal rupture in which the CNV typically presents several months after the event.[8] In the present case, the laser energy reflected from the glass slide inflicted more damage to a small region of the retina, and resulted in more rapid progression of the CNV. From this perspective, thorough short-term follow-up is important in cases of laser-induced retinal injury. OCTA is a noninvasive imaging modality that yields high-resolution depth-resolved images of the CNV network and changes to it after the injection of antivascular endothelial growth factor.[9] In the present case, OCTA facilitated clear visualization of the CNV network on the initial visit, regression after the 2nd intravitreal injection of bevacizumab, and an increase in size after 4 months. The BCVA of this patient improved gradually, and it is important to undertake OCTA examinations periodically so as not to miss CNV aggravation.

4. Conclusion

To the best of our knowledge, this is the 1st case report of CNV secondary to laser energy reflected from the glass slide in a dermatologist. Our experience highlights that the operators should always use laser safety eyewear during cosmetic procedures involving laser devices, so as to prevent the occurrence of ocular complications. CNV progression secondary to laser injury may be more rapid than that associated with other causes, and short-term follow-up with OCTA is recommended.

Author contributions

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