Korean J Ophthalmol 2020;34(5):422-423
https://doi.org/10.3341/kjo.2020.0062

Intraocular Foreign Body Causing Retinal and Choroidal Ischemia

Dear Editor,

Intraocular foreign bodies (IOFBs) may cause infection or mechanical trauma to the intraocular structures. Most IOFBs infiltrate the posterior segment of the eye and require surgical removal [1]. Massive retinal and choroidal ischemia occurring as complications of IOFB have rarely been reported. We report a unique clinical case of retinal and choroidal ischemia secondary to an IOFB without any gross retinal vascular obstruction.

A 61-year-old man presented with sudden vision loss and pain in the right eye because of ocular trauma during mowing. On examination, the visual acuity of the patient was hand motion. Non-contact tonometry revealed an intraocular pressure of 5 mmHg. Slit-lamp examination revealed an oblique linear full-thickness corneal laceration with inferior protrusion of the iris and a microhyphema. The fundus appeared hazy because of the vitreous hemorrhage. Non-contrast computed tomography of the orbit demonstrated a highly attenuated substance within the inferior vitreous cavity of the right eye, which was suggestive of a metallic IOFB, presumed to be impacted or penetrated in the eyeball (Fig. 1A). Simultaneous corneal suturing, crystalline lens extraction, vitrectomy, removal of the IOFB, and intravitreal silicone oil injection were performed after 25 hours post-trauma. During the surgery, a silver-colored, flat metallic ferroalloy foreign body measuring 1.2 mm was found located near the optic disc (Fig. 1B). This IOFB was not impacted and could be easily removed. Massive reddish intraretinal hemorrhage was observed over a wide retinal area, along with a tree-branch shaped whitish ischemic change in the choroid after the

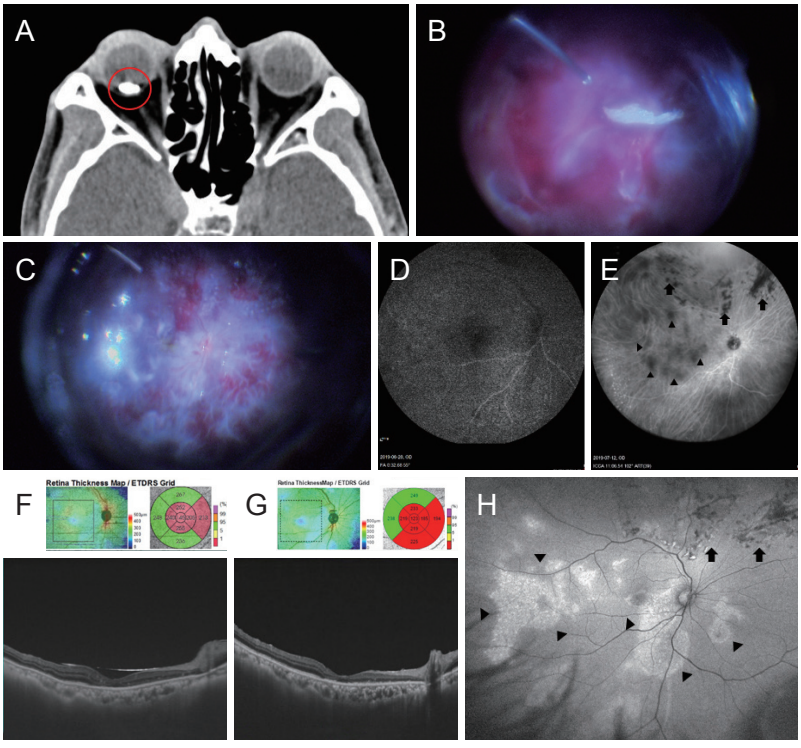

Fig. 1. Clinical photographs of this case. (A) Computed tomography scan shows a metallic intraocular foreign body (red circle) near the optic disc of the right eye. (B) Intraoperative photograph of the fundus shows a metallic foreign body on the retinal surface lying near the optic disc with thick vitreous hemorrhage. (C) Diffuse retinal hemorrhage and whitish ischemic change is observed after removal of the foreign body. (D) Fluorescence angiography performed 1 week postoperatively shows a delay in retinal arterial filling time. (E) Indocyanine green angiography performed 1 month postoperatively reveals a delay in choroidal circulation with a patchy choroidal filling defect (arrow heads) and previous endolaser photocoagulation scars (arrows). (F) Optical coherence tomography performed at 1 week after surgery shows thinning of both the inner and outer retina. (G) Optical coherence tomography performed 1 week after the second surgery shows thinning of the retina on the fovea. (H) Fundus autofluorescence performed 6 months postoperatively shows hyperfluorescence due to retinal and choroidal ischemia (arrow heads) and previous chorioretinal endolaser scars (arrows). A written consent for the images was obtained from the patient. ETDRS = early treatment diabetic retinopathy study.

Received: May 8, 2020 *Final revision:* June 29, 2020 *Accepted:* July 14, 2020

IOFB removal (Fig. 1C). Clinically, signs of endophthalmitis were not observed; therefore, no intravitreal antibiotics or antifungal agents were administered. However, Gram staining and bacterial and fungal cultures of the removed foreign body were performed. Intravenous fluoroquinolone was administered for 5 days postoperatively. Further, oral fluoroquinolone was administered for another 5 days after discharge.

The visual acuity improved to finger counting at 30 cm at 1-week follow-up. The arm-to-retina time was delayed to 32 seconds during fluorescence angiography (Fig. 1D), and the arteriovenous passage time was prolonged up to 44 seconds. Indocyanine green angiography performed 1 month postoperatively revealed a remarkable delay in the choroidal filling time of over 30 seconds with a patchy choroidal circulatory defect (Fig. 1E). Optical coherence tomography revealed inner and outer retinal thinning; the central macular thickness was 145 μm (Fig. 1F). Results of postoperative Gram staining and bacterial and fungal cultures were negative. Secondary intraocular lens implantation and silicone oil removal were performed 3 months post-trauma. One week after the second surgery visual acuity improved to 20 / 1,000. Optical coherence tomography revealed thinning of the retina on the fovea, which had not recovered (Fig. 1G). Six months postoperatively visual acuity improved to 20 / 32. However, fundus autofluorescence showed a wide area of hyperfluorescence (Fig. 1H).

In this case, the ferroalloy metallic IOFB resulted in retinal thinning, which could have occurred as follows: first, the IOFB could have caused undetected bacterial or viral infection resulting in endophthalmitis, which could have caused retinal and choroidal ischemia, leading to macular atrophy. According to a previous study, macular atrophy was reported in five of 46 patients with endophthalmitis [2]. Second, direct mechanical damage by an IOFB to the optic disc or adjacent retina could have reduced the retinal thickness and choroidal vasculature. In this case, the IOFB was not impacted at the time of surgery, but it could have been spontaneously extruded as the surgery was delayed. Acute ganglion cell loss has also been reported in a patient with optic nerve damage caused by trauma [3]. Retinal vessel damage also causes a decrease in the total retinal thickness [4]. Finally, retinal ischemia could have occurred due to ocular siderosis. Arteriolar narrowing and retinal ischemia can occur due to ocular siderosis around the IOFB [5]. In this case, the IOFB was located near the optic disc; therefore, it could have caused ischemia of the entire retina and choroid by affecting the large vessels. Thus, an IOFB can result in retinal and choroidal ischemia and can eventually cause retinal atrophy. Therefore, this possibility should not be overlooked in cases of metallic IOFBs, especially when imaging studies suggest the location of foreign bodies near the optic disc and they are not removed within a short time.

Jae Gon Kim, Yu Cheol Kim, Kyung Tae Kang
Department of Ophthalmology, Dongsan Medical Center, Keimyung University School of Medicine, Daegu, Korea
E-mail (Kyung Tae Kang): kkt0604@dsmc.or.kr

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

References

1. Loporchio D, Mukkamala L, Gorukanti K, et al. Intraocular foreign bodies: a review. *Surv Ophthalmol* 2016;61:582-96.
2. Zhou T, Aptel F, Bron AM, et al. Longitudinal study of retinal status using optical coherence tomography after acute onset endophthalmitis following cataract surgery. *Br J Ophthalmol* 2017;101:1211-6.
3. Vessani RM, Cunha LP, Monteiro ML. Progressive macular thinning after indirect traumatic optic neuropathy documented by optical coherence tomography. *Br J Ophthalmol* 2007;91:697-8.
4. Podkowinski D, Philip AM, Vogl WD, et al. Neuroretinal atrophy following resolution of macular oedema in retinal vein occlusion. *Br J Ophthalmol* 2019;103:36-42.
5. Sandhu HS, Young LH. Ocular siderosis. *Int Ophthalmol Clin* 2013;53:177-84.