Lens Siderosis Resulting from a Tiny Missed Intralenticular Foreign Body

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We report a patient with clinical ocular siderosis at the time of presentation but undetectable intraocular foreign body on computed tomography (CT) and ultrasonography. A 24-year-old man suffered from right ocular injury when hammering metal on metal. Slit-lamp examination revealed a small corneal perforating wound and an iris hole, but no intraocular foreign body was found under fundus examination. There was also no evidence of intraocular foreign body on ultrasonography and orbital CT scan. About 1 month later, lens siderosis with cataract formation developed, and the patient received lens extraction with intraocular lens implantation. During the operation, a small ($< 1 \times 1 \times 1$ mm in size) intralenticular foreign body of metal material was found and removed. The patient's visual acuity improved from 6/20 to 6/6 on the next day. A patient suspected to have intraocular foreign body should be followed-up closely; it is better to remove the foreign body before siderosis bulbi occurs. [*J Chin Med Assoc* 2009;72(1):42–44]

Key Words: cataract, intraocular foreign body, siderosis, trauma

Introduction

A ferrous intraocular foreign body (IOFB) can cause deposition of iron molecules in the ocular tissues, and siderosis bulbi will ensue if the IOFB is not removed.[1–3] Thus, when detected, an IOFB should be removed promptly to prevent these complications. Detection and localization of the foreign body can be impeded if the injury has produced a hyphema, cataract or vitreous hemorrhage. The gold standard for early detection of IOFB is computed tomography (CT) and ultrasonography; however, small IOFBs may not be detected by these methods until signs of ocular siderosis have occurred. We report a patient with clinical ocular siderosis at the time of presentation but undetectable IOFB on CT and ultrasonography.

Case Report

A 24-year-old man was referred to us with blurred vision after a right ocular injury about 1 month previously when hammering metal on metal without safety goggles. Best-corrected visual acuity was 6/20 in the right eye and 6/6 in the left eye. Slit-lamp examination revealed a small inferonasal self-sealed, full-thickness, corneal perforating wound about 1 mm from the limbus and a corresponding iridotomy posterior to the wound (Figure 1A), and brownish spots in the lens capsule with cataract formation (Figure 1B). Seidel's test was negative, and the anterior chamber was deep, with a trace amount of cells. No intraocular foreign body was found under dilated fundus examination. The ophthalmic examination was otherwise normal. There was no evidence of IOFB on ultrasonography. Neither skull X-ray nor orbital CT revealed any evidence of high-density foreign body in the eyeball and peribulbar regions. Electroretinography showed normal waveforms in both eyes.

About 1 month later, lens siderosis with cataract formation of the right eye was diagnosed, and the patient received lens extraction with posterior chamber intraocular lens implantation. During the operation, a tiny ($< 1 \times 1 \times 1$ mm in size) embedded intralenticular metallic foreign body (Figure 2) was found, without posterior segment involvement, and was removed successfully.

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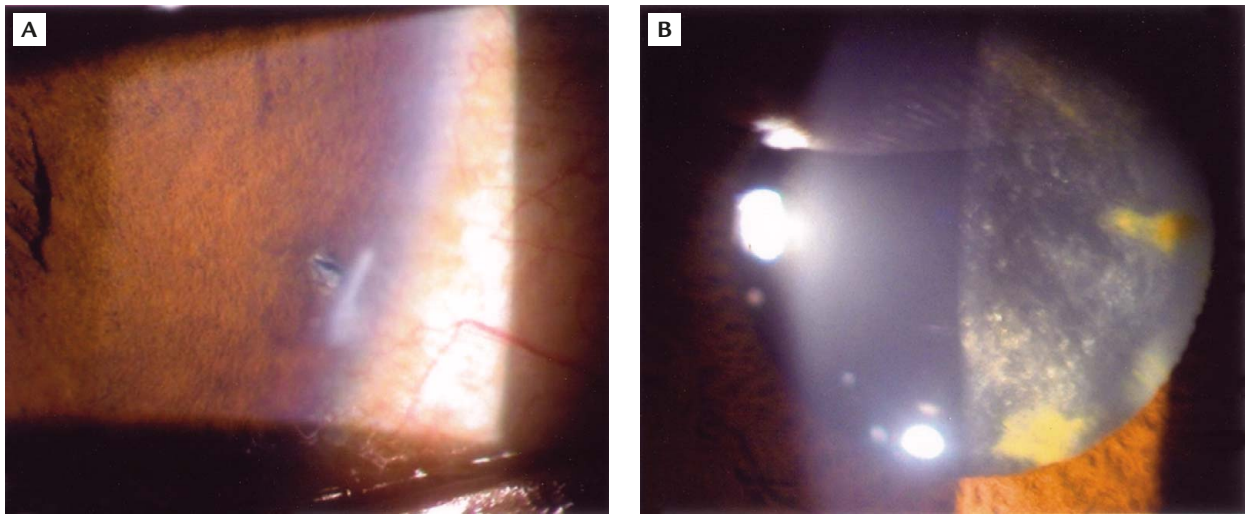

Figure 1. Slit-lamp photograph of the right eye. (A) A small inferonasal, self-sealed, full-thickness, corneal perforating wound, an iris hole. (B) Brownish spots in the lens capsule with cataract formation.

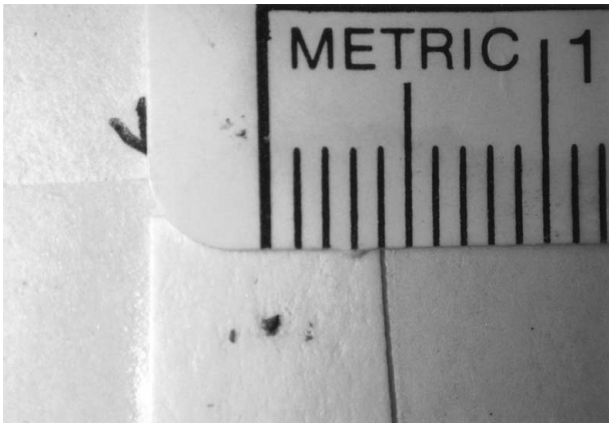

Figure 2. The removed intralenticular metallic foreign body ($< 1 \times 1 \times 1$ mm in size).

Histology showed brownish depositions in epithelial cells of the lens capsule (Figure 3A), and iron was identified in the lens capsule with Prussian stain (Figure 3B). The patient's visual acuity improved to 6/6 on the next day. There was no evidence of endophthalmitis or siderosis bulbi during postoperative follow-up.

Discussion

Intralenticular foreign bodies account for about 10% of all IOFB injuries,[2] and in most cases, cataract formation will occur.[2,3] Some 78–86% of IOFBs are reported to be metallic.[4–6] Iron, either pure or as an alloy, is the most frequent component of metallic IOFBs. Iron-contaminated intraocular tissues have a characteristic clinical picture termed siderosis. Siderosis affects virtually all ocular tissues, and the most characteristic changes include the iris and lens, causing iris heterochromia and cataract formation, as well as pigmentary degeneration of the retina. A cataract may serve as a sensitive indicator of early siderosis. Lens siderosis involves iron depositions in the epithelial cells of the anterior capsule, forming many brownish or rusty spots. Eventually, the whole lens may take on a deep yellow coloration with large, rusty-brown patches. Toxic changes are irreversible after a certain stage of siderosis bulbi. In most patients, early surgical removal of the metallic foreign body is the treatment of choice.[2,3]

Although the gold standard for detection of an occult foreign body is still considered to be CT, small IOFBs may be missed with this technique.[7,8] Our patient presented with clinical evidence of unilateral ocular siderosis with an intralenticular foreign body that was undetectable by conventional radiography. One reason may have been the small size of the foreign body. Another reason may be that the change in metal density as a result of dissolution in the lens created a "subthreshold" level of detectability on standard radiography and CT.

CT detection of small foreign bodies relies on the resolving capability of the CT scanner as well as the density, size, and position of the foreign body. CT slice thickness therefore influences the detection of small foreign bodies, and a tiny foreign body < 1 mm in diameter may be missed by CT scan with a slice thickness of 2–5 mm, which is a standard setting. Our CT unit produced contiguous 2-mm images that might easily overlook a very small foreign body.

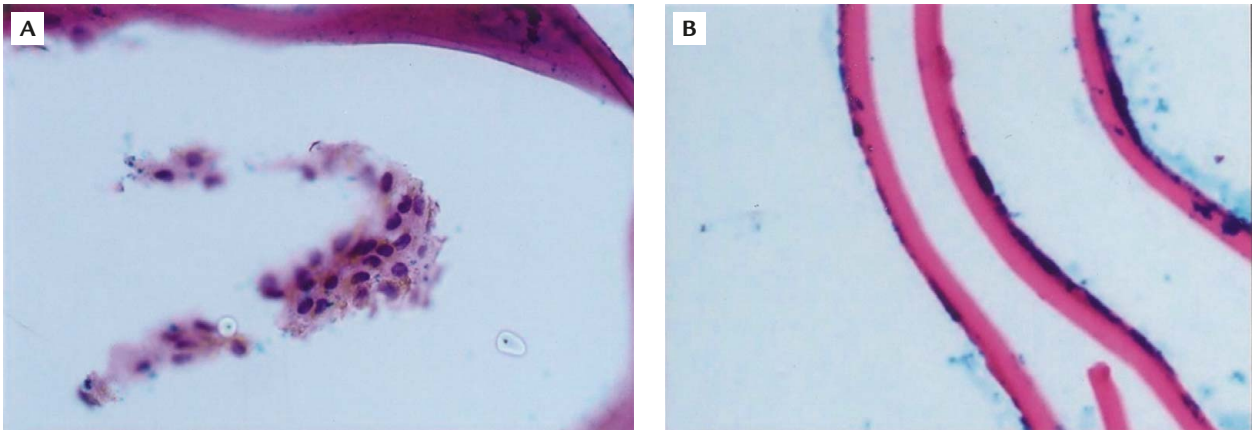

Figure 3. (A) Brownish depositions were noted in epithelial cells (hematoxylin & eosin; 100×). (B) Iron was identified in the lens capsule using Prussian stain (400×).

Postoperatively, visual acuity improved to 6/6. The good visual improvement may have been due to the fact that the foreign body was limited to the lens area and the integrity of the posterior capsule was maintained, sparing the posterior segment. This case report highlights the limited reliability of orbital radiography in detecting a tiny IOFB, the need for close follow-up in patients highly suspected to have an IOFB, and early removal of the IOFB to save vision.

In conclusion, even with negative imaging findings, IOFB should be suspected in patients with ruptured eyeballs with full-thickness corneal perforation and iris hole. Despite the presence of good vision, a patient suspected to have an intralenticular ferrous foreign body should be followed-up closely, and the foreign body detected and removed before irreversible siderosis bulbi occurs.[2,3]

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