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CT Evaluation of Plastic Intraocular Foreign Bodies

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The high sensitivity of CT in detecting metallic orbital foreign bodies has been previously described [1–6]. While there has been some success in detecting glass fragments, detecting intraorbital foreign bodies made of wood has been very unsatisfactory [1, 2, 6–9]. Plastic orbital implants are easily recognized on CT as high-attenuation-value images [6, 7]. This report presents two cases of plastic foreign bodies within the globe that appeared as low-attenuation-value images.

The studies were performed on a GE 8800 CT/T scanner, and the globe was evaluated by contiguous 1.5-mm axial sections obtained parallel to the canthomeatal line. The gantry was not angulated to facilitate multiplanar reconstruction imaging. A phantom containing eight different types of plastics, having a wide range of appearance by CT, was used to further evaluate the appearance of plastic foreign bodies.

Case Reports

Case 1

An 8-year-old boy was struck in the left eye by an unknown object after a firecracker exploded near him. The next day his eye became swollen and inflamed. On admission, the conjunctiva was injected and a full-thickness corneal laceration was noted. The lens showed a dense, white cortical cataract that precluded a view of the posterior chamber. The right eye was normal on examination.

A B-scan sonogram of the left eye showed trace vitreous debris but no retinal detachment or foreign body, although the patient was minimally cooperative for the examination. A CT scan showed periorbital edema and an irregular and deformed lens secondary to trauma. A foreign body was not seen on the initial viewing. A low-attenuation-value image was seen on the left in an axial section obtained tangential to the superior pole of the globes (Fig. 1). This was thought to be an artifact arising from the naso-orbital angle.

The patient was taken to surgery for repair of the corneal laceration, a pars plana lensectomy, and vitrectomy. During the vitrectomy, a plastic foreign body was found embedded in the superior retina and was removed. The foreign body measured 7.0 mm × 2.5 mm × 0.6 mm (10.5 mm³). Fulminant endophthalmitis was noted in the posterior chamber and intensive local and intravenous antibiotic therapy was started. After surgery, the patient had only light perception in the left eye. A repeat B-scan sonogram showed a total retinal detachment.

Reevaluation of the CT scan showed the plastic fragment as a lucent band in the superior pole of the left globe. The lucent foreign body measured a −20 CT number and was seen better at a narrow window width of 150 (Fig. 1). An oblique coronal reconstruction image, along the long axis of the lucent band, confirmed the intraocular location of the foreign body.

Case 2

A 9-year-old boy had been playing with a bottle rocket when it exploded close to his face. He noted blood from his left eye. Ocular examination on admission showed only light perception in the left eye and a full-thickness corneal laceration. The right eye was normal.

A preoperative CT scan showed vitreous and choroidal hemorrhage and a ruptured lens in the left eye. Alucent object was seen in the mid-aspect of the left globe measuring a −70 CT number (Fig. 2A). This was thought to represent an intraocular foreign body and was confirmed in the parasagittal reconstruction image (Fig. 2B).

The patient was operated on for repair of the corneal laceration. A limited B-scan sonogram at the time of surgery showed echoes within the globe that were thought to be secondary to vitreous hemorrhage. Attenuation of the sonographic beam did not locate a foreign body. A follow-up sonogram 3 days later showed a retinal detachment that was confirmed on the repeat CT study. The foreign body was redemonstrated on CT, but again not definitely located with sonography because of considerable vitreous debris. At the second surgery, a large retinal tear was observed but a foreign body was not found and the surgery was stopped because of uncontrolled bleeding.

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plastic intraocular foreign bodies were seen better at a narrow window width, as used for intraorbital wood fragments [6, 7].

Since a description of the varied CT appearance of plastics is not found in the literature, we determined the CT characteristics of eight different types of plastics by using a water-filled phantom (Fig. 3). The plastics seen in the image of the phantom are (from the lowest CT number to the highest) polypropylene, ultrahigh molecular weight polyethylene, high-density polyethylene, polystyrene, nylon, polymethyl methacrylate (plexiglass), polysulfone, and acetal. It is apparent that the plastics have a wide range of CT attenuation values (−125 to +364). The true range of plastics is greater, as Teflon has a CT density of approximately +1000. The plastic foreign bodies in the two cases presented are in the −20 to −70 range. These plastics are most likely polyethylene and polystyrene mixtures, which are inexpensive plastics and can be found in cheap, disposable products such as fireworks.

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