

Intraorbital Wood Foreign Body Mimicking Air at CT : A Case Report¹

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Computed tomography revealed variable sized small areas of extremely low attenuation in the right orbit of a 45-year-old woman who had fallen face down. The appearance and attenuation of the areas suggested air, but on wide window-width images attenuation was seen to be higher than that of sinus air. We report a case involving intraorbital wood foreign bodies which on CT mimicked the appearance of air and which were surgically removed.

Index words : Foreign bodies
Orbit, CT
Orbit, injuries

Because they are not radiopaque(1, 2), wooden foreign objects within the orbit may be difficult to diagnose clinically or by imaging studies; their appearance on computed tomographic(CT) images varies according to the type of wood, whether it is fresh or dry, the degree of hydration, and the presence of certain types of paint(3-7). Because severe complications secondary to infection can occur, the detection of these foreign bodies is important. We describe a case in which an intraorbital wood foreign body mimicked on CT the appearance of air.

Case Report

A 45-year-old woman presented with a blunt injury to the right eye, and complained of ocular pain and bleeding in the zygomatic area. Four hours earlier, she had fallen face down while walking.

On physical examination the right eye was found to be swollen, and the patient described it as painful. Multiple dirty lacerated wounds were noted at its inferior and lateral fornix, and some foreign bodies were identified. Because of the pain and swelling, visual acuity was difficult to evaluate. The pupil was slightly

dilated and fixed, and not reactive to light. Motility was restricted but difficult to evaluate.

Unenhanced 2-mm axial and direct coronal scans were obtained through the orbit with a Prospeed unit (GE Medical Systems, Milwaukee, USA). These revealed multiple variable sized areas of extremely low attenuation in the orbit's inferior and temporal aspects, just outside the globe. The density of these areas was indistinguishable from air present within the adjacent ethmoid sinus on soft-tissue window image, and the attenuation value of lesions ranged from -243 to -430 Hounsfield units(mean; -374 HU)(Fig. 1A). On wide window-width images, however, the density of wood foreign bodies was higher than the sinus air shadow (Fig. 1B).

The patient underwent surgery for removal of dry wood foreign bodies from the orbit(Fig. 2), the removed total fragments correlated well with the size of the low density areas of attenuation seen on CT. The patient was prescribed antibiotics and her clinical status showed mild improvement.

Discussion

A wooden foreign body inside the orbit or cranium may be difficult to diagnose, especially in cases of apparently minor trauma. Wood is not radiopaque and its identification on CT images is often possible only through the interpretation of secondary mass effects

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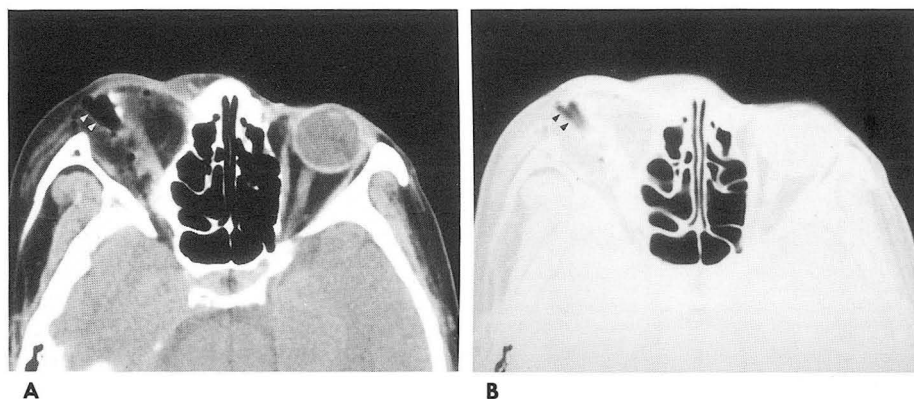


Fig. 1. Unenhanced axial CT of the orbit. (A) Soft-tissue window setting. 12 × 8 mm sized air shadow (arrowheads) is seen in the inferior portion of the right orbit outside the globe. (B) The attenuation of wood foreign body mimics air bubble (arrowheads) is higher than that of the sinus air on wide window widths (window width; 1082 HU, window level; -487 HU).

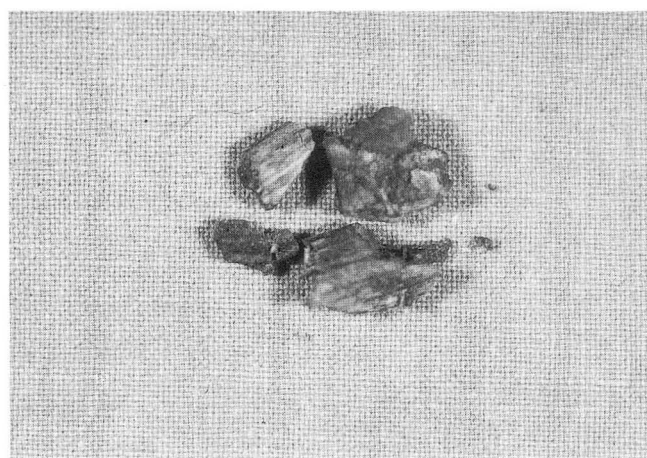


Fig. 2. Photography of the surgically removed dry wood foreign bodies from the right orbit. The removed total fragments are correlated with the size of the low density areas of attenuation at CT.

and tissue reactions. A retained orbital or cranial wood foreign body may cause local hemorrhage or abscess, and the mortality rate for patients in whom intracranial wood foreign bodies are present is approximately 25% (8). The removal of a wooden foreign body prior to the development of destructive tissue changes is thus extremely important.

Imaging studies aimed at detecting wood foreign bodies within the orbit have met with varying degrees of success. Plain film radiography is not useful in detecting intraorbital wood foreign bodies, and the prior use of ophthalmic ultrasonography has been suggested (9). This procedure, however, requires the involvement of an expert, specific technology, and is time consuming. Moreover, ultrasonography may not be able to evaluate the complete orbit and cannot detect intraorbital wood surrounded by air.

Through the use of CT, several authors (1-3, 10) have been able to detect intraorbital wood, and CT also led to the detection of associated problems such as

fractures and abscesses. The appearance of wood foreign objects on CT varies according to the type of wood. Kadir et al. (4) soaked various types of wood in water for 24 hours and found CT attenuation ranging from -552 to +54 HU. The attenuation of heavy woods was substantially higher than that of water, whereas light woods, plywood and particle board showed attenuation similar to this or lower and sometimes approximated that of air. They speculated that low attenuation was due to trapped air, which we presume is the reason for the appearance of foreign bodies on our patient's scans. Glatt et al. (5) found that dry pieces of balsa, plywood, pine, cedar, and oak were hypoattenuating (-984 to -356 HU). After three days' immersion in water, plywood became hyperattenuating, but the CT appearance of balsa, pine, cedar, and oak was unaffected. Fresh branches of pine, cedar, and walnut were hypoattenuating, with occasional hyperattenuating rings. To optimize the visibility of intraorbital wood, wide window widths of up to 1000 HU have been proposed (1, 2, 5, 10). In our patient, the mean attenuation value of wood foreign bodies was -374 HU, which was higher than that of air within the sinuses, as seen on wide window-width images (Fig. 1B). Because of volume averaging, however, the measurement of absorption coefficients was not helpful in distinguishing small pieces of wood from air bubbles (1, 5).

Weisman et al. (6) reported a case in which a hyperattenuating wood intraorbital foreign body caused a temporal lobe abscess. They attributed the hyperattenuation to the coating of paint found on the foreign body. Lindahl (7) also reported a wood foreign body that was hyperattenuating, and attributed this to surrounding inflammation and abscess formation.

The choice of imaging studies for the evaluation of intraorbital foreign bodies is controversial. Ossoing (9) suggested that standardized ophthalmic ultrasonography should be used first, while Hansen et al. (11)

recommended CT as the single most effective test, claiming that in cases involving suspected penetrating orbital and cranial wounds. It should be the tool for primary diagnostic examination. CT is also valuable for the detection of associated problems such as fractures and abscesses. Green et al. (12) and Specht et al. (13) recommend MR imaging if plain radiography, CT and ultrasonography are negative in a patient in whom a nonmetallic intraorbital foreign body is strongly suspected.

In conclusion, the use of thin-section axial and coronal CT with variable window widths is extremely useful for the detection of wood foreign bodies, associated injuries and complications, but is not infallible(1-3). MR imaging might be helpful when CT is negative. Diagnostic accuracy can be increased by the knowledge that the appearance of wood varies and on CT can mimic air.

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CT상 공기로 오인되는 안와내 나무조각에 의한 이물질: 1예 보고¹

배 원 경

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안구주위 외상으로 내원한 45세 여자 환자에서 CT상 공기음영으로 보이는 여러개의 저음영병소가 안구내에서 관찰되었고 수술에서 나무조각이물질로 확인된 1례를 보고한다. 연부조직영상에서 이들 공기같은 음영은 골영상(bone window image)에서는 주위의 부비동공기보다 음영이 높게 나타났다. 안구외상 환자의 CT를 판독하는 경우에 나무조각이물질은 연부조직영상(soft tissue window image)에서 공기로 오인할 수 있으므로 주의를 환기하고자 한다.

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