ORIGINAL RESEARCH PAPER

Radiodiagnosis

IMAGING OF AN UNUSUAL INTRA-ORBITAL FOREIGN BODY WITH AN UNUSUAL COURSE

KEY WORDS: Foreign body, intracranial extent, CT scan.

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ABSTRACT

Organic foreign bodies like wood within the orbit are difficult to diagnose both clinically and by imaging modalities. Severe complications secondary to infection can occur so their detection is important. We report CT scan imaging findings of a wooden intra-orbital foreign body with an unusual intracranial extent in a 6-year-old male patient.

INTRODUCTION

Intra-orbital foreign body is one of the common ophthalmic emergencies presenting to the casualty which is an important cause of ocular morbidity as well. They are more common in males and in the paediatric population. The clinical course and management depend upon the composition of the foreign body. Most of the metallic and inorganic foreign bodies can be left alone if asymptomatic as they remain quiescent for a long time. However organic foreign bodies like wood have high incidence of complications and need urgent removal. The role of imaging is to determine the severity of injury, the nature and deeper extension of foreign body, detect complications and help plan the treatment. Radiography, CT, MR imaging, and sonography have been advocated for the detection of foreign bodies with CT scan being the investigation of choice not only for detection but also for localizing the foreign body.

CASE REPORT

A 6-year old male patient presented with history of pain and swelling of the right eye following penetrating injury to right eye by a foreign body.

Clinical examination revealed proptosis, erythema of the eyelids and ophthalmoplegia. Plain CT scan of the orbit was performed and was examined in the soft tissue and bone windows. It revealed mild proptosis of the right globe with surrounding fat stranding. A linear elongated radiolucent area of very low attenuation was seen along the medial wall of orbit. The density of it was indistinguishable from the air suggesting a wooden foreign body. It was contiguously extending intracranially into the ipsilateral cavernous sinus via the superior orbital fissure with its tip reaching up to the petrous apex (Figs 1 and 2). The ipsilateral globe and optic nerve appeared uninvolved. Patient underwent surgery which confirmed the presence of a wooden foreign body. A post-operative CT angiography was performed which showed mild focal narrowing of the cavernous segment of the right internal carotid (ICA) and right ophthalmic arteries (Fig 3). Rest of the right ICA and its branches were normal. Prominence of the ipsilateral ophthalmic vein and asymmetry of cavernous sinuses (right more than left) were also noted. Follow up CT angiography performed after 5 months revealed normal right internal carotid and ophthalmic arteries with no focal stenosis suggesting previously seen focal stenosis was probably due to spasm (Fig 4).

DISCUSSION

Shelsta et al retrospectively studied 23 orbital injuries and concluded that vegetative injuries were responsible for 35% of intra-orbital foreign bodies (1). Intraorbital foreign bodies are divided into following types depending upon their composition as metallic, inorganic and organic. Most of the metallic and inorganic foreign bodies can be left alone if asymptomatic as they remain quiescent for long time without causing complications. However organic foreign bodies like wood are a good media for microbial agents and so have high incidence of complications such as pan-ophthalmitis, abscess, fistula etc.

Imaging studies help in the detection and localization of the foreign body. Peterson Jeffrey et al retrospectively reviewed the characteristic imaging features of wooden foreign bodies and concluded that the imaging appearance of wooden foreign bodies is variable; however, imaging can be quite specific and when taken in the appropriate clinical setting, the imaging should reliably suggest the diagnosis (2). Plain film radiography is unrewarding due to its limitations. Radiographs have been reported to reveal a wooden foreign body in only 15% of patients (3). Wooden foreign bodies are usually radiolucent, associated with gas in the matrix. However, the small size of the foreign body often is not sufficient to create an appreciable radiolucency (4). Ultrasonography (combined A scan and B scan) has been suggested to be first investigation (5). But it is observer dependent and requires expertise. It may not completely evaluate orbit and detection of air associated with wooden foreign body is difficult. CT scan is extremely useful in the detection, localization and to see extent of the intraorbital foreign body (6-8). Wider window width improves the visualization of small air foci which are associated with wooden foreign bodies. CT scan also helps in the detection of associated injuries, their severity and complications. Images reconstructed in various planes helps surgeon in planning the surgical management.

CT scan appearance of the wood has been described as very low attenuated area mimicking air within orbit (8, 9). On MRI, it appears hypointense on all pulse sequences in contrast to intraorbital fat. When compared with MR imaging, CT has the advantage of being less expensive, more readily available and faster to perform.

In our case, the intraorbital wooden foreign body and its intracranial extent was best seen on wide window width. Previous authors have suggested using wide window widths up to 1,000

HU with a level of –500 HU for optimization of detection (10). The attenuation of a retained wooden foreign body varies in relation to the content of air and fluid in the interstices of the wood. When dry wood enters the body, it is predominantly filled with air. Dry wood, with high air content, has been reported to mimic a gas collection. In our case, it appeared as an extremely low attenuation structure mimicking air. However, its elongated and well delineated shape helped to differentiate it from air. It had an unusual extent into the middle cranial fossa through the superior orbital fissure. The inner tip of foreign body was seen reaching up to the apex of petrous bone coursing through the ipsilateral cavernous sinus. Mild focal stenosis of the cavernous segment of the ipsilateral ICA was noted with non-visualization of ophthalmic artery probably due to spasm which was confirmed on follow up CT angiography. However, the globe and optic nerve appeared uninvolved. There was no obvious brain parenchymal injury.

CONCLUSION

In conclusion, axial and reconstructed CT images at variable window widths are not only extremely useful for the detection of intraorbital wooden foreign bodies but also to determine their extent and relation to the adjoining structures facilitating surgical management as well. Hence a CT study can be used as a first line investigation modality in such cases.

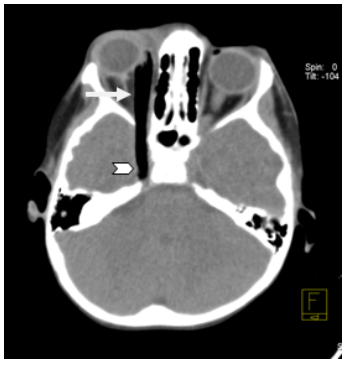

Figure 1: Axial CT scan of the brain shows a linear radiolucent wooden foreign body in the right orbit (arrow) extending intracranially into the ipsilateral cavernous sinus (arrowhead) up to the tip of petrous apex.

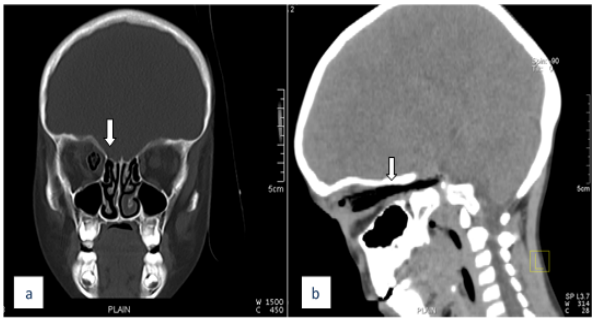

Figure 2: Reformatted coronal (a) bone window and sagittal (b) soft tissue window showing extent of wooden foreign body.

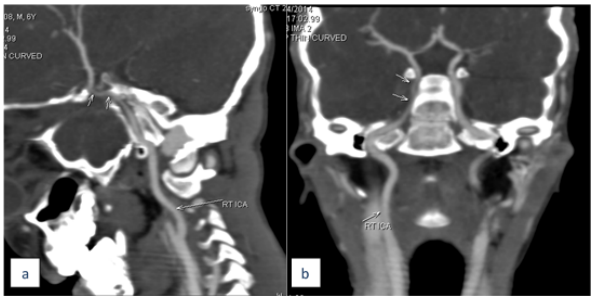

Figure 3: Reformatted sagittal (a) and coronal (b) CT angiography images showing mild focal narrowing of the cavernous segment of right ICA (arrows).

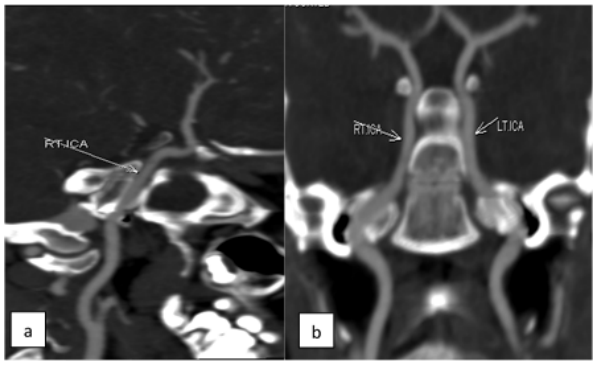

Figure 4: Reformatted sagittal(a) and coronal (b) images of follow up CT angiography showing resolution of previously noted focal stenosis of cavernous segment of right ICA.

REFERENCES

1. Shelsta HN, Bilyk JR, Rubin PA, Penne RB, Carrasco JR. Wooden intraorbital foreign body injuries: Clinical characteristics and outcomes of 23 patients. Ophthal Plast Reconstr Surg 2010; 26:238-44.
2. Peterson Jeffrey et al American Journal of Roentgenology. 2002;178: 557-562
3. Anderson MA, Newmeyer WL, Kilgore ES. Diagnosis and treatment of retained foreign bodies in the hand. Am J Surg 1982;144:63–67
4. Monu JU, McManus CM, Ward WG, Haygood TM, Pope TL, Bohrer SP. Soft-tissue masses caused by long-standing foreign bodies in the extremities: MR imaging findings.AJR 1995;165:395–397
5. Ossoinig KC. Detection of wood foreign bodies (letter).Ophthalmology1991;98:274
6. Zenter J, Hassler W, Petersen D. A wooden foreign body penetrating the superior orbital fissure. Neurochirurgia1991;34:188–190
7. Glatt HJ, Custer PL, Barrett L, Sartor K. Magnetic resonance im-aging and computed tomography in a model of wooden foreign bodies in the orbit. Ophthalm Plast Reconstr Surg1990;6:108–114
8. Roberts CF, Leehey PJ III. Intraorbital wood foreign body mimicking air at CT. Radiology1992;185:507–508
9. Specht CD, Varga JH, Jalali MM, Edelstein JP. Orbitocranial wooden foreign body diagnosed by magnetic resonance imaging: dry wood can be isodense with air and orbital fat by computed tomography. Surv Ophthalmol1992;36:341–344
10. Ho VT, McGuckin JF, Smergel EM. Intraorbital wooden foreign body: CT and MR appearance. AJNR1996;17:134–136