2. Mingers AM, Heimburger N, Zeitler P, Kreth HW, Schuster V. Homozygous type I plasminogen deficiency. Semin Thromb Hemost 1997;23:259-69.
3. Pons V, Olivera P, García-Consuegra R, et al. Beyond hemostasis: the challenge of treating plasminogen deficiency. A report of three cases. J Thromb Thrombolysis 2016;41:544-7.
4. Bierly JR, Blandford DL, Weeks JA, Baker RS. Ligneous conjunctivitis as a complication following strabismus surgery. J Pediatr Ophthalmol Strabismus 1994;31:99-103.
5. Schuster V, Serregard S. Ligneous conjunctivitis. Surv Ophthalmol 2003;48:369-88.
6. Twining SS, Wilson PM, Ngamkitidechhakul C. Extrahepatic synthesis of plasminogen in the human cornea is upregulated by interleukin-1 alpha and 1 beta. Biochem J 1999;339:705-12.
7. Melikian HE. Treatment of ligneous conjunctivitis. Ann Ophthalmol 1985;17:763-5.
8. Tatlipinar S, Akpek EK. Topical ciclosporin in the treatment of ocular surface disorders. Br J Ophthalmol 2005;89:1363-7.
9. De Cock R, Ficker LA, Dart JG, Garner A, Wright P. Topical heparin in the treatment of ligneous conjunctivitis. Ophthalmology 1995;102:1654-9.
10. Watts P, Suresh P, Mezer E, et al. Effective treatment of ligneous conjunctivitis with topical plasminogen. Am J Ophthalmol 2002;133:451-5.
11. Ang MJ, Papageorgiou KI, Chang SH, Kohn J, Chokron Garneau H, Goldberg RA. Topical plasminogen as adjunctive treatment in recurrent ligneous conjunctivitis. Ophthal Plast Reconstr Surg 2017;33:e37-9.
12. Fernandes M, Sridhar MS, Sangwan VS, Rao GN. Amniotic membrane transplantation for ocular surface reconstruction. Cornea 2005;24:643-53.
13. Conforti FM, Di Felice G, Bernaschi P, et al. Novel plasminogen and hyaluronate sodium eye drop formulation for a patient with ligneous conjunctivitis. Am J Health Syst Pharm 2016;73:556-61.

Orbital wooden foreign body manifesting as hyperdensity on computed tomography

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Detection of wooden foreign bodies within the orbit can be difficult on imaging, including computed tomography (CT). When visible, wood appears iso- or hypodense and can mimic air or fat. We report the case of a 3-year-old boy with progressive orbital cellulitis following a penetrating wood injury to the right lower lid. CT imaging revealed a linear hyperdensity contiguous with an orbital abscess. He underwent a right anterior orbitotomy with abscess drainage, during which exploration revealed a 2.3 cm retained wooden foreign body. The appearance of wood as hyperdense on imaging is unusual. In the appropriate context, high clinical suspicion for retained wood should be maintained with any irregularity on CT imaging.

Orbital wooden foreign bodies are uncommon but can be associated with high rates of infection.[1] Unfortunately, retained wood is often difficult to diagnose with imaging, because wood tends to mimic the appearance of air or fat on computed tomography (CT), and magnetic resonance imaging (MRI) does not always detect organic foreign bodies. We describe a case of poorly responsive cellulitis of the right lower lid 4 days after a penetrating wood injury with evidence of a an orbital abscess and linear hyperdensity on imaging.

Case Report

A 3-year-old boy rolled off a sled that was being pulled over a slight decline; a stick found embedded in his right lower lid was pulled out by his mother. He was immediately brought to the emergency department, where the wound was cleaned; an ophthalmology consultation found no globe rupture. The following day he started amoxicillin clavulanate by his pediatrician for a red and swollen right lower lid; when this failed to demonstrate improvement in less than 24 hours, the boy was brought to the emergency room, where 2 doses of intravenous ampicillin/sulbactam were administered. The following day, his pediatrician switched him to oral clindamycin. After continuing to show progression overnight, the patient presented to the Harkness Eye Institute for evaluation. On review of systems, there was no fever or chills, no change in appetite, no change in activity level and no pain. On ophthalmic examination, visual acuity was 20/30 in each eye without correction, there was no relative afferent pupillary defect, and extraocular motility was full in both eyes. The marginal reflex distance 1 (MRD1) was 1 mm on the right and 4 mm on the left with a marginal reflex distance 2 (MRD2) of 2.5 mm on the right and 6 mm on the left. There was significant edema and erythema of the right lower lid with a circular scab medially and slight bruising along the central tear trough. Medially the right lower lid was firm and tender without fluctuance. There was mild edema without erythema of the right upper lid. The anterior segment was unremarkable, specifically with no conjunctival injection. There was no optic nerve edema and the posterior segment was unremarkable.

Given the concern for retained wood or other foreign material in the right lower lid, the patient underwent CT of the orbits with contrast. The CT revealed a right

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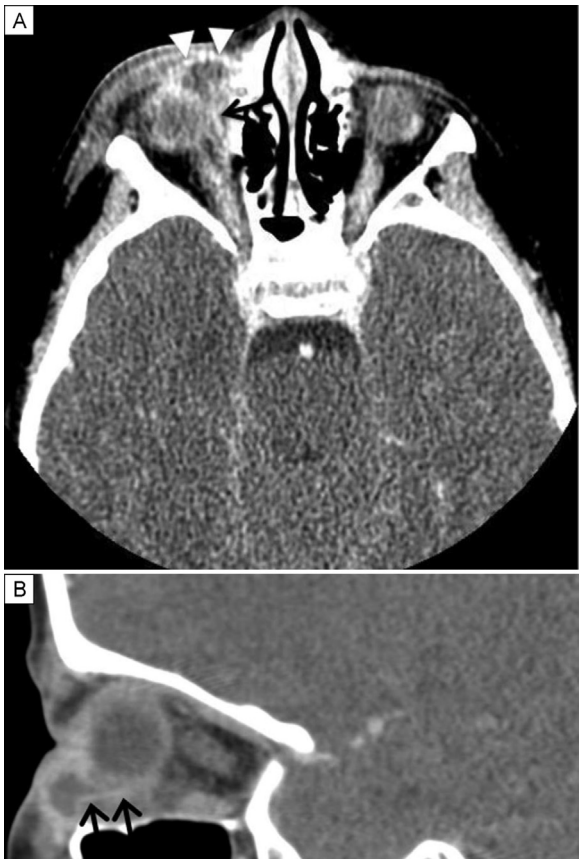

FIG 1. Preoperative computed tomography. A, axial contrast image of the abscess (white arrowheads) and foreign body (black arrow). B, Sagittal contrast image of the abscess anteriorly and the linear foreign body (black arrows).

inferomedial abscess measuring 1.2 × 1.4 × 1.2 cm (anteroposterior by transverse by craniocaudal), with mass effect on the right globe (Figure 1). There was a linear hyperdensity measuring 59.8 hounsfield units (HU) contiguous with this abscess that was suggested to represent a foreign body that was seen best with a window width of 155 and level of 42. Evaluation with lung and bone windows did not assist in visualization of the foreign body. The patient underwent a right anterior orbitotomy with abscess drainage, during which exploration revealed a broken piece of wood. Careful dissection demonstrated that the stick was deeply embedded within the orbit and surrounded by fat. On removal, the wood measured 2.3 cm in length (Figure 2). The wound was further explored and all visual evidence of bark was removed. The wound was irrigated with betadine followed by saline, and an orbital drain was placed. Wound cultures for aerobic, anaerobic, and fungal organisms sent at the time of surgery ultimately demonstrated no growth. The patient was treated with intravenous ampicillin/sulbactam for 2 days, at which point the orbital drain was removed, and was then transitioned to oral amoxicillin clavulanate to complete a 14-day antibiotic course. On follow-up 4.5 months after excision, there was no evidence of recurrent infection.

FIG 2. Wood foreign body measuring 2.3 cm removed from the right lower lid during the anterior orbitotomy and abscess drainage.

Discussion

Currently the most commonly used imaging modality for orbital wooden foreign body is CT, which also can visualize abscess formation or the presence of an orbital fracture.[2] Previous reports have described using thin axial and coronal CT images at wide window widths to assist in the detection of wooden foreign bodies.[2,3] In a 2014 analysis of 32 cases, CT imaging was definitive in 72% of cases and suggestive in 28% of cases.[4]

The detection of wooden foreign bodies is challenging, because wood is typically of low attenuation and can mimic air or fat on the standard CT window settings, although the density can be highly variable.[2,5-7] Prior studies have reported ranges in HU based on the type and state of wood. For instance, dry pine has a density of −656 HU, whereas fresh pine has a density of −24 HU.[8] Wood is highly porous and has been reported to change in attenuation depending on local environment: dry wood with higher air content has low attenuation mimicking a gas collection and wood that has absorbed fluid demonstrates higher attenuation. In our case, the wooden foreign body was detected on imaging as a linear hyperdensity with HU 59.8, an atypical attenuation for wood reported in vivo and not easily visualized on wide window images. An HU of 59.8 would be slightly brighter than soft tissues such as extraocular muscles, which have an HU between 30

and 40 and much brighter than fat, which has a HU of −100.[9] The higher attenuation of the wood in our case is likely from the wooden fragment accumulating fluid in the 4 days following the initial injury. Additionally, the use of lung (window width = 1465; level −498) and bone (window width = 3077; level, 570) window settings, which have been reportedly useful, did not improve visualization of the wooden foreign body. The wooden foreign body was best visualized with a window width of 155 and level of 42, which is a narrower window than is previously reported in the literature.[10]

Orbital abscess, as seen in our case, is frequently associated with wooden foreign bodies. The infection rates with wooden foreign bodies within the orbit can be as high as 64%, with worse complications in those with intracranial extension.[1] Antibiotics are of limited efficacy when a wooden foreign body is present; this is thought to be due to the development of a biofilm that impairs the effectiveness of antibiotics.[1] Additionally, the ability of wood to fragment into multiple pieces can make retrieval of the wood very difficult; one case describes a patient undergoing four medial orbital explorations without removal of the foreign body until there was spontaneous extrusion of small pieces of wood through the sinus.[11] Our patient has not developed any evidence of recurrent infection 4.5 months following his presentation.

References

1. Shelsta HN, Bikyk JR, Rubn PAD, Penne RB, Carrasco JR. Wooden intraorbital foreign body injuries: clinical characteristics and outcomes of 23 patients. OPRS 2010;26:238-44.
2. Ho VT, McGuckin JF, Smergel EM. Intraorbital wooden foreign body: CT and MR appearance. AJNR Am J Neuroradiol 1996;17:134-6.
3. Peterson JJ, Bancroft LW, Kransdorf MJ. Wooden foreign bodies: imaging appearance. AJR Am J Roentgenol 2002;178:557-62.
4. Tas S, Top H. Intraorbital wooden foreign body: clinical analysis of 32 cases, a 10-year experience. Ulus Travma Acil Cerr Derg 2014;20:51-5.
5. Dalley RW. Intraorbital wood foreign bodies on CT: use of wide bone window settings to distinguish wood from air. AJNR Am J Neuroradiol 1995;164:434-5.
6. Roberts CF, Leehey PJ III. Intraorbital wood foreign body mimicking air on CT. Radiology 1992;185:507-8.
7. Krimmel M, Cornelius CP, Stojadinovic S, Hoffmann J, Reinert S. Wooden foreign bodies in facial injury: a radiological pitfall. Int J Oral Maxillofac Surg 2001;30:445-7.
8. McGuckin JF, Akhtar N, Ho VT, Smergel EM, Kubacki EJ, Villafana T. CT and MR evaluation of a wooden foreign body in an in vitro model of the orbit. AJNR Am J Neuroradiol 1996;17:129F-33F.
9. Naik MN, Tourani KL, Sekhar GC, Honavar SG. Interpretation of computed tomography imaging of the eye and orbit: a systematic approach. Indian J Ophthalmol 2002;50:339-53.
10. Kudo S, Takei T. Computed tomography settings for optimal detection of wooden foreign bodies. Am J Emerg Med 2016;34:2237-8.
11. Panda BB, Kim UR. Complications of retained intraorbital wooden foreign body. Oman J Ophthalmol 2014;7:38-9.

Late exudative retinopathy after laser treatment for retinopathy of prematurity in a child with dyskeratosis congenita

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Exudative retinopathy may be a manifestation of a variety of isolated ocular or systemic diseases in children. We report the case of a teenager with dyskeratosis congenita who developed a unilateral late exudative retinopathy after having previous laser treatment for threshold retinopathy of prematurity as an infant.

Case Report

A 14-year-old girl, former premature infant, presented at the Northwell Health pediatric ophthalmology clinic for her routine yearly examination. She denied any changes in vision. She was born at 29 weeks' gestational age weighing 930 g and was delivered by Caesarian section for fetal distress and placental bleeding. She subsequently developed threshold retinopathy of prematurity (ROP) in both eyes at 40 weeks and was treated with laser ablation. After laser treatment, she developed temporal dragging of the macula, high myopia, and mild refractive amblyopia in both eyes. At 8 years of age, bone marrow failure led to the diagnosis of autosomal dominant dyskeratosis congenita. Both she and her mother were found to have a causative *TERT* gene mutation.

One year prior to presentation, the patient's visual acuity had been 20/30 in the left eye. On her current examination, best-corrected visual acuity was 20/30 in the right eye and 20/100 in the left eye. Her pupils were round and reactive, with no evidence of afferent pupillary defect. She was orthotropic at distance and near, with full versions. Slit-lamp examination was unremarkable for any anterior segment or lenticular pathology. On cycloplegic refraction she had unchanged high myopic astigmatism in both eyes, −16.0 +4.00 ×93 in the right eye and −16.50 +4.75 ×90 in the left eye. Dilated fundus examination revealed

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