AJNR Am J Neuroradiol 26:1855–1857, August 2005

Case Report

Temporal Lobe Intraparenchymal Retained Foreign Body from Remote Orbital Trauma

Joseph M. Aulino, Kymberly A. Gyure, Andrew Morton, and John W. Cole

Summary: We present the case of a 35-year-old man with a new onset of seizure disorder who was found to harbor an intraparenchymal retained foreign body related to remote orbital trauma. Imaging revealed a rim-enhancing anterior medial temporal lobe mass. Histologic evaluation of the resected mass showed evidence of acute and chronic inflammation with associated foreign material. The patient described a "bar fight" 16 years previously in which he received a blow to the orbit with a pool cue stick. The diagnosis of a foreign body reaction should be considered when an intraparenchymal mass is identified in this location.

Penetrating orbital trauma is common, and clinical evidence of deep injury may be subtle; the injury may appear deceptively superficial. Orbital abscess formation in the setting of a retained foreign body after penetrating orbital trauma has been well documented (1). The risk for late complications increases with organic wooden foreign objects such as tree branches and pencils (2), which can harbor bacteria and fragment during removal. Imaging in the acute setting of suspected penetrating orbital trauma is essential. The penetrating injury may extend beyond the confines of the bony orbit. We report a case of a retained intracranial foreign body from penetrating orbital trauma leading to granuloma formation within the temporal lobe parenchyma in a patient with new-onset seizures 16 years after the initial trauma.

Case Report

A 35-year-old man presented to the emergency department after a generalized seizure. Nonenhanced CT revealed extensive left temporal lobe vasogenic edema (Fig 1). Laboratory analysis was unremarkable. Elicited clinical history at the time of initial presentation was noncontributory. Physical examination revealed no focal neurologic deficit. A detailed ophthalmologic examination was not performed. MR imaging showed an anterior, medial, and inferior superficial left temporal lobe intraparenchymal, multilocular 19-mm rim-enhancing mass with surrounding vasogenic edema (Fig 2). Fast spin-echo (FSE) T2-weighted images showed susceptibility effect centrally within the lesion, which was preoperatively thought to reflect associated old blood products (hemosiderin). Surgical excision was performed from a left pterional approach. A very firm lesion was encountered that appeared to be adherent to the dura overlying the anterior cavernous sinus. During the course of excision, a "splinter" of foreign body was encountered, which appeared to be fiberglass or wood. The firm lesion was removed by using rongeurs. The patient recovered uneventfully without immediate neurologic deficit or complication. Pathologic evaluation of the surgical specimen revealed attenuated fibrous connective tissue with changes of acute and chronic inflammation surrounding segments of foreign material (Fig 3). Upon further questioning, the patient described an altercation 16 years previous, at which time he received a blow to the left orbit with a billiard cue stick. Our patient experienced a favorable outcome despite the diagnosis of a retained foreign body following remote penetrating orbital trauma.

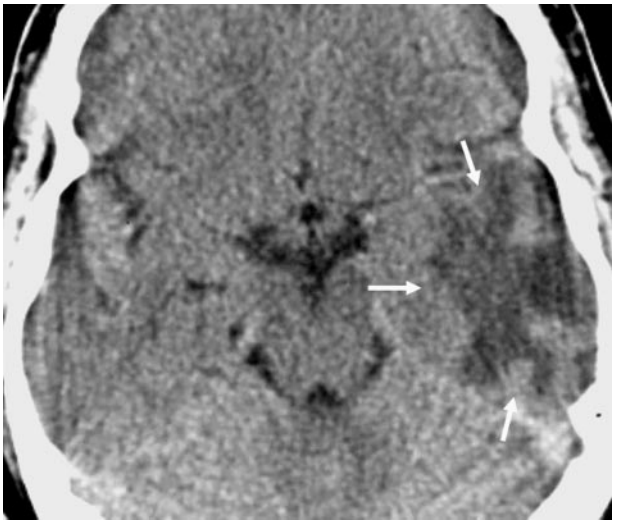

FIG 1. Axial unenhanced CT image obtained through the level of the midbrain shows left temporal lobe hypoattenuation (*arrows*), reflecting vasogenic edema, predominantly involving white matter.

Discussion

Imaging of penetrating orbital trauma is usually performed in the acute setting to identify foreign material. The injury may be transorbital, extending through the orbit into the adjacent anterior or middle cranial fossae, or the adjacent paranasal sinuses, with potentially lethal consequences. The most common routes by which foreign bodies penetrate intracranially are through the orbital roof and through the superior orbital fissure (2–4), the latter likely reflect-

Received November 11, 2003; accepted after revision September 24, 2004.

From the Department of Radiology and Radiological Sciences (J.M.A.), Vanderbilt University Medical Center, Nashville, TN; and the Departments of Pathology (K.A.G.) and Neurology (J.W.C.), University of Maryland Medical Center, and American Radiology Services (A.M.), Baltimore, MD.

Address correspondence to: Joseph M. Aulino, MD, Department of Radiology and Radiological Sciences, Section of Neuroradiology, Vanderbilt University Medical Center, 21st Avenue South, Nashville, TN 37232-2675.

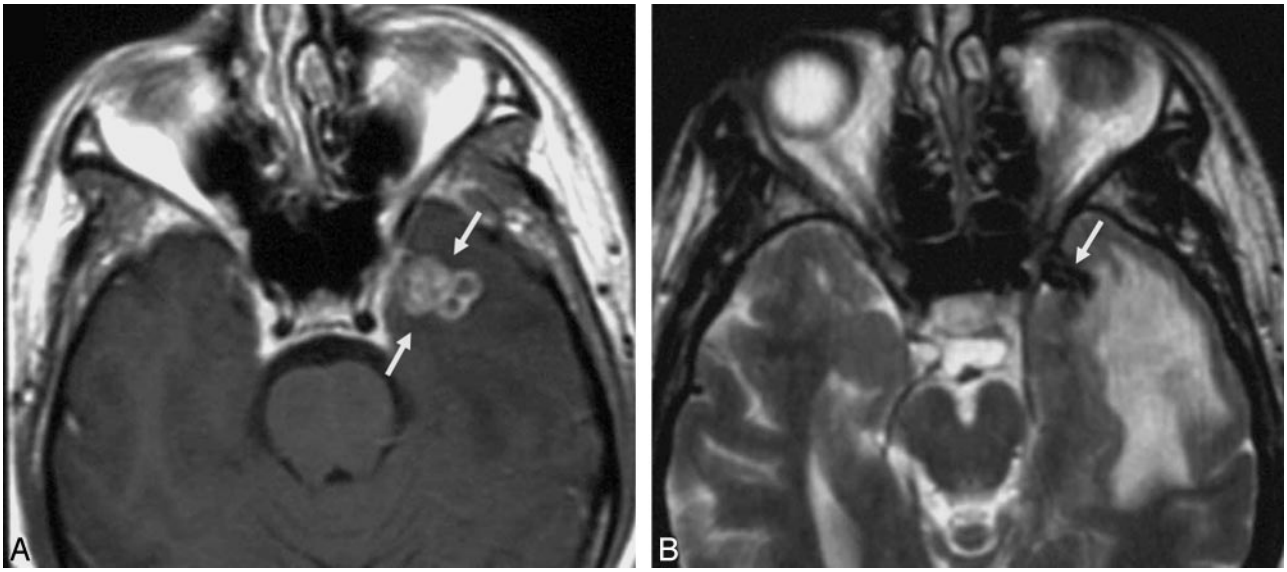

FIG 2. Axial MR images obtained at the level of the temporal lobes. T1-weighted postcontrast image (*A*) shows a rim-enhancing, multilocular masslike lesion within the anterior left temporal lobe (*arrows*). The enhancement corresponds to the chronic granulation tissue surrounding the foreign body. FSE T2-weighted image (*B*) shows surrounding confluent T2-hyperintense vasogenic edema. Susceptibility effect (*arrow*) was preoperatively thought to reflect old blood products (hemosiderin) but most probably was the foreign body itself (likely fiberglass, according to the surgeon).

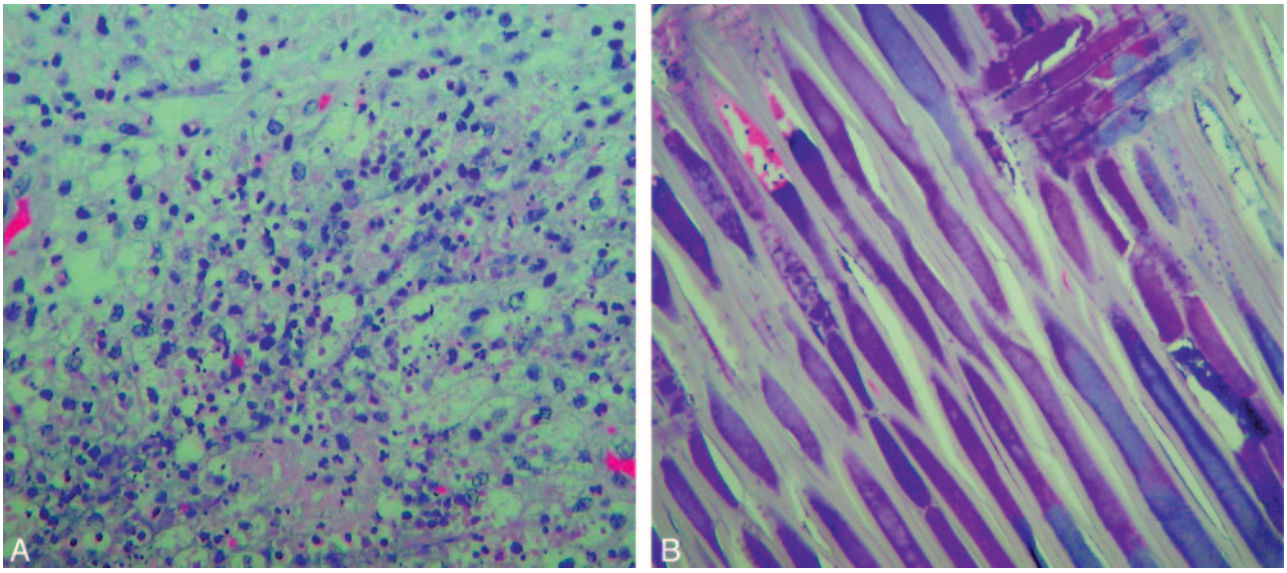

FIG 3. Foreign body reaction.

A, Acute and chronic inflammatory changes. A mixed inflammatory infiltrate, composed of neutrophils, lymphocytes, plasma cells, and macrophages, was present in the biopsy specimen (hematoxylin-eosin, original magnification ×200).

B, Segments of foreign material (hematoxylin-eosin, original magnification ×400).

ing the route of entry to the left middle cranial fossa in our patient. The foreign body may have resided within the temporal lobe as a result of the penetrating injury, but more likely migrated to this location over time.

Metal and graphite foreign bodies are often recognized by their characteristic hyperattenuated CT imaging appearance. The CT appearance of wood can be highly variable, sometimes appearing isoattenuated, and other times resembling air (5). MR may be complementary to CT to identify foreign bodies, although MR should not be performed if a metallic foreign body is suspected (4). In the case of this patient, in light of the lack of hemosiderin staining on histologic evaluation, the foreign material itself (likely fiberglass) appeared to cause most of the susceptibility effect seen on the preoperative MR images. The surrounding granulation tissue may have contributed to some of the susceptibility effect, similar to the characteristic T2-hypointense rim of a mature abscess.

New-onset seizures are a typical manifestation of both recent and remote penetrating trauma (6, 7). Late-onset seizures can be induced secondary to grad-

ual gliosis, and in cases of a retained foreign body, secondary to progressive granulomatous change and delayed abscess formation (6). Late presentation of a retained orbital foreign body has been well documented (1, 8). Retained *intracranial* foreign material after penetrating orbital trauma is less common (9–12). Horner et al described a case of frontal lobe abscess from which a small wooden pencil shard was removed; relevant medical history included meningitis 13 years previously, likely related to the initial injury (10). Horner et al also reported a frontoparietal abscess in a 4-year-old child 3 years after penetrating orbital injury (10). The initial traumatic event may not be identified (9).

It cannot be determined whether the intraparenchymal foreign body in our patient migrated to the position over time or if it arrived to that position as a result of the initial trauma. In light of the medial location of the foreign body within the left middle crania fossa with attenuated, fibrous tissue abutting the lateral dura of the anterior cavernous sinus, we theorize that the foreign body migrated through the superior orbital fissure. Migration of chronic intracranial intraparenchymal metallic foreign bodies has been most commonly attributed to gravity (13). Movement of wooden foreign objects over time is rarely seen by imaging, in light of the fact that they are usually promptly removed because of the high risk of infection (3, 14).

Our case is unusual because of the long period between the initial trauma and the presentation. The characteristic intracranial anterior temporal lobe location and the presence of susceptibility effect should alert the radiologist as to the etiology of the lesion, and further history should be sought.

References

1. Heyner FJ, Passmore JW. **Pseudotumor of orbit caused by retained foreign body.** *Am J Ophthalmol* 1965;59:490–492
2. Bard LA, Jarret WH. **Intracranial complications of penetrating orbital injuries.** *Arch Ophthalmol* 1961;71:332–343
3. Guthkelch AN. **Apparently trivial wounds of the eyelid with intracranial damage.** *BMJ* 1960;2:842–844
4. Matsumoto S, Hasuo K, Mizushima A, et al. **Intracranial penetrating injuries via the optic canal.** *AJNR Am J Neuroradiol* 1998;19:1163–1165
5. Hansen JE, Gudeman SK, Holgate RC, et al. **Penetrating intracranial wood wounds: clinical limitations of computerized tomography.** *J Neurosurg* 1988;68:752–756
6. Annegers JF, Hauser WA, Coan SP, Rocca WA. **A population-based study of seizures after traumatic brain injuries.** *N Engl J Med* 1998;338:20–24
7. Olson S. **Review of the role of anticonvulsant prophylaxis following brain injury.** *J Clin Neurosci* 2004;11:1–3
8. Brock L, Tanenbaum HL. **Retention of wooden foreign bodies in the orbit.** *Can J Ophthalmol* 1980;15:70–72
9. Blumberg JM, Johnston EH. **Forensic pathologist and unsuspected foreign body.** *J Forensic Sci* 1963;8:231–249
10. Horner FA, Berry RG, Frantz M. **Broken pencil points as a cause of brain abscess.** *N Engl J Med* 1964;271:342–345
11. Mikhael MA, Mattar AG. **Case report: chronic graphite granulomatous abscess simulating a brain tumor.** *J Computer Assist Tomogr* 1977;1:513–516
12. Kazarian EL, Stokes NA, Flynn JT. **The orbital puncture wound: intracranial complications of a retained foreign body.** *J Pediatr Ophthalmol Strabismus* 1980;17:247–250
13. Rengachary SS, Carey M, Templer J. **The sinking bullet.** *Neurosurgery* 1992;30:291–294
14. Liu D, Al Shail E. **Retained orbital wooden foreign body: a surgical technique and rationale.** *Ophthalmology* 2002;109:393–399