Delayed brain abscess related to a retained foreign body with culture of *Clostridium bifermentans*

Case report

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Although it is well documented that retained foreign bodies are associated with delayed intracranial abscess, there are few reports of anaerobic organism growth. A case is presented in which a left parieto-occipital abscess surrounded a metallic fragment implanted when a mortar shell exploded in Vietnam 15 years before. The diagnostic evaluation and surgical management of this case are presented.

**KEY WORDS**

cerebral abscess • *Clostridium* • foreign body

Several authors have discussed craniocerebral trauma sustained during the Vietnam conflict, but there have been few reports of the delayed intracranial problems associated with that generation of wounds. Delayed brain abscesses have been reported in many settings with retained foreign bodies. Cushing believed that the track caused by a penetrating cerebral war wound should be carefully debrided, but that removal of metallic fragments should not be attempted if they are located deep in the brain. On the other hand, retained bone fragments from war wounds should all be removed if possible because of their potential to harbor persistent infection. We report here the development of a *Clostridium bifermentans* brain abscess adjacent to a retained metallic fragment 15 years after a penetrating injury.

**Case Report**

This 36-year-old right-handed man was injured by metallic fragments from a mortar shell while serving in Vietnam in 1970. Metallic and bone fragments entered the left frontal area, and some metallic fragments lodged against the inner table of the left occipital region. He required an emergency bifrontal craniectomy, resection of the left frontal lobe, and debridement of the fragment track. No attempt was made to retrieve the occipital fragment. Records indicate that this fragment entered the skull above the nasion, passing through the left thalamus and upper midbrain about 1.5 cm above the pineal and proceeding to the left occipital region under the calvaria, where it remained. Postoperatively, he had fixed and dilated pupils, no oculocephalic reflex, a sluggish left corneal response, no right corneal response, and extensor posturing. He slowly regained neurological function and underwent a bifrontal cranioplasty 1 year later. Operative records at that time noted that the retained occipital metallic fragment was visible on the x-ray film. He was subsequently sent home, where he progressed to the point of right hemiparesis and dense expressive aphasia, but otherwise was caring for himself with help from his family. A routine computerized tomography (CT) scan in 1979 showed atrophy and postoperative changes in the left frontal area and the metallic fragment in the left occipital region with some surrounding calcification; however, there was no evidence of an abscess or mass effect.

**Examination.** The patient was referred to our hospital in 1985 with a 2-week history of headaches, right-sided numbness, and a new onset of Jacksonian seizures beginning in the right hand, progressing up the arm, and involving the right leg. On admission, he was afibrile. Skull x-ray films revealed the metallic fragment in the left parietal region (Fig. 1). A CT scan showed a 5-cm left parieto-occipital ring-enhancing lesion con-
FIG. 1. Lateral (left) and anteroposterior (right) skull x-ray films showing location of a metallic fragment in the left parietal region.

Fig. 2. Computerized tomography scans after injection of contrast medium showing left frontal encephalomalacia and a ring-enhancing mass in the left parieto-occipital region.

sistent with an abscess and old frontal encephalomalacia (Fig. 2). The white blood cell (WBC) count was 8900/cu mm, with a differential analysis of 69% granulocytes, 26% lymphocytes, and 5% monocytes; erythrocyte sedimentation rate was 63 mm/hr.

On physical examination, the patient had a well healed bifrontal craniotomy scar and exotropia in the left eye; his neck was supple with no meningeal signs. Neurologically, he was alert and oriented to person and place. Communication was limited to one or two words, generally “yes” or “no.” There was no vision in the left eye which had an afferent pupillary defect. Visual field testing of the right eye demonstrated a temporal hemianopsia. A right hemiparesis and cortical hemisensory deficit were also noted.

A course of intravenous penicillin G, 2 million U/6 hrs, and intravenous metronidazole, 500 mg/6 hrs, was initiated. Angiography showed an avascular mass in the left occipital region. Three days after starting antibiotics the patient underwent percutaneous CT-guided needle drainage of the abscess and irrigation with Bacitracin solution. A Gram stain showed 4+ WBC and no organisms. By the 7th postoperative day, the first bacterial growth was reported as Clostridium bifermens.

Operation. Because of the retained foreign body in the region of the abscess, the patient underwent a left parieto-occipital craniotomy for removal of the metallic fragment and abscess. The abscess capsule incorporating the metal fragment was removed en bloc. Gram staining of the abscess fluid obtained at this operation revealed no organisms, and no growth was reported on culture of the fluid. He did well postoperatively without alteration of his neurological status. Antibiotic therapy was continued for 2 weeks; then he was discharged home. His headaches ceased, and at follow-up examination 1 month postoperatively, he had some improvement in strength on his right side.

Discussion

Hammon, in reviewing a large series of cranioencephalomalacia (left eye; his neck was supple with no meningeal signs. Neurologically, he was alert and oriented to person and place. Communication was limited to one or two words, generally “yes” or “no.” There was no vision in the left eye which had an afferent pupillary defect. Visual field testing of the right eye demonstrated a temporal hemianopsia. A right hemiparesis and cortical hemisensory deficit were also noted.

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Delayed brain abscess from a foreign body

more slowly with an organism of low virulence\textsuperscript{1,8,10} or low bacterial concentration.\textsuperscript{7} Strictly anaerobic organisms are not typically cultured from brain abscesses, but reportedly can be obtained from between 9\% and 16\% of unselected cases.\textsuperscript{18} \textit{Clostridium} is found in the soil and in intestinal flora;\textsuperscript{13} its low virulence may account for the walled-off capsule in this patient. In a large series of patients studied at Cook County Hospital,\textsuperscript{9} 114 patients had \textit{Clostridium} isolated from lung, abdomen, muscle tissue, and blood; however, there was only one brain abscess. \textit{Clostridium} has been isolated in 16\% of abdominal knife and gunshot wounds.\textsuperscript{9} \textit{Clostridium bifermentans} is a slow-growing anaerobe, and has been found in lung tissue infections,\textsuperscript{16} frostbitten tissue, and blood cultures.\textsuperscript{8} No report of its isolation from brain is available to our knowledge. Iron enhances \textit{C. bifermentans} growth in vivo.\textsuperscript{19} Our patient had iron crystals in the abscess which could have initiated the growth of the bacteria from the spore stage. The spores swell and elongate to the vegetative phase after a period of dormancy, and begin to multiply.\textsuperscript{24} The abscess in this case was sterilized by penicillin, metronidazole, and antibiotic irrigation of the cavity, which again suggests a lower virulence than some other species of \textit{Clostridium}. The patient's records show no history of infection at his initial craniotomy or cranioplasty. This infection may have been caused by a soil organism with spores left at his initial injury, or it may have been spread hematogenously from bowel flora.

The present case is interesting because of the latency to typical presentation, the organism found, and the fact that a CT scan 6 years before did not reveal evidence of indolent infection. This report emphasizes that intracranial complications of retained metallic fragments may occur many years after injury.

References

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\textsuperscript{1} Manuscript received August 21, 1985.

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