

# *Propionibacterium acnes* Brain Abscess Appearing 10 Years After Neurosurgery

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**Objective:** To describe a case of *Propionibacterium acnes* infection arising 10 years after neurosurgery and to review the literature regarding similar cases and their treatment.

**Design:** Case report.

**Setting:** Hospital of the University of Pennsylvania.

**Patient:** A 70-year-old man with an intracerebral abscess and 2 biopsies culture positive for *P acnes* 10 years after subdural hematoma evacuation.

**Intervention:** Surgical biopsy followed by 6 weeks of intravenous vancomycin.

**Main Outcome Measures:** Magnetic resonance imaging, neurologic examination, and microbiology culture results.

**Results:** Biopsies obtained from abscesses grew only *P acnes*. Magnetic resonance imaging and serial neurological examinations showed marked improvement after 6 weeks of intravenous vancomycin.

**Conclusions:** Infection by *P acnes* can complicate neurosurgical procedures as late as 10 years after surgery and therefore should be considered in the evaluation of patients presenting with neurologic signs and symptoms with a history of neurosurgery.

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**P**ROPIONIBACTERIUM ACNES IS A gram-positive, slowly growing, anaerobic bacillus that commonly colonizes the skin and occasionally causes postoperative wound infections. The identification of *P acnes* in an infection may be difficult because of its slow growth, making it an important consideration in the differential diagnosis of postoperative infections before confirmation through culture test results. Its indolence has been demonstrated in patients with central nervous system (CNS) infections presenting months to years after intracranial surgical procedures, even without the placement of shunts or other foreign bodies. Here we describe a patient who developed an intracerebral *P acnes* abscess 10 years after a craniotomy.

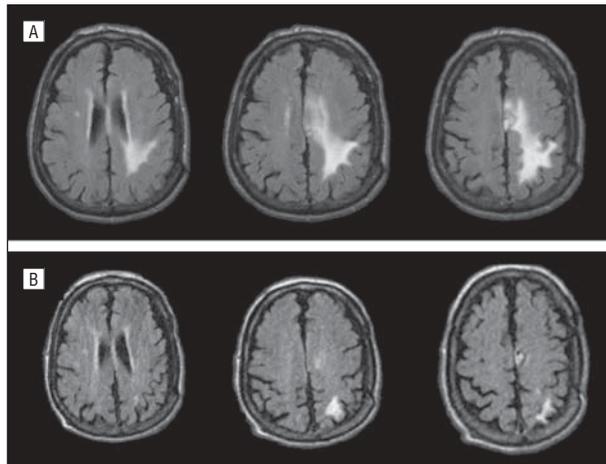
seizures, he was subsequently given phenobarbital until his current admission. His shaking episodes were thought to be simple partial seizures, and they resolved with administration of levetiracetam. An initial brain computed tomographic scan revealed no abnormalities. Several days after admission, the patient became obtunded and required intubation. After treatment for aspiration pneumonia and extubation he demonstrated an expressive aphasia and right-sided hemiplegia. Magnetic resonance imaging of the brain showed 2 areas of hyperintense T2 and fluid-attenuated inversion recovery (FLAIR) signal abnormalities with rim enhancement in the left posterior parietal lobe (**Figure**). These areas became progressively larger and more contiguous over the following 2 weeks, and they demonstrated restricted diffusion and surrounding vasogenic edema. A large sebaceous cyst was observed in the scalp overlying the site of his prior craniotomy.

Biopsies of both rim-enhancing areas revealed polymorphonuclear infiltrates and necrosis. Anaerobic cultures from both lesions grew only *P acnes*. The patient received 6 weeks of intravenous vancomycin.

## REPORT OF A CASE

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A 70-year old right-handed man presented with new onset of episodic right arm and leg shaking. He had a history of a traumatic left temporal subdural hematoma requiring evacuation 10 years prior to admission. Although he had no history of



**Figure.** Magnetic resonance imaging (1.5 T) of the brain. Fluid-attenuated inversion recovery signal abnormalities are shown in the left posterior parietal lobe before (A) and after (B) 6 weeks of intravenous antibiotics.

cin, and magnetic resonance imaging performed 4 weeks later revealed some resolution in the T2/FLAIR signal abnormalities, with decreased edema. During subsequent weeks his aphasia and right-sided weakness improved to the level of only a mild residual pronator drift.

#### COMMENT

We concluded that this patient suffered from a delayed postoperative intracranial *P acnes* abscess because of the localization of this abscess within his prior operative field and the typically slow and variable growth of *P acnes* in other reported cases.

*Propionibacterium acnes* is a likely etiology of infection after intracranial operative procedures because of its prevalence in scalp flora, where it resides in the anaerobic environment of the hair follicle. In a recent study, the incidence of *P acnes* in postoperative CNS infections was second only to *Staphylococcus aureus* in 1587 patients undergoing intracranial procedures.<sup>1</sup> It is possible that *P acnes* may contaminate biopsy specimens as well as neurosurgical fields. However, the growth of only *P acnes* from microbiologic specimens, along with other evidence of an infectious process, supports a pathogenic role for this organism. It is unclear whether an underlying or acquired immune defect increases the risk of intracranial infection with *P acnes* following intracranial operations, but this has been suggested.<sup>2,3</sup>

Most reported cases of *P acnes* brain abscesses have occurred in association with shunt infections and are less common in the absence of infected hardware.<sup>4</sup> More rare are reports of multiple (presumably metastatic) brain abscesses from *P acnes* in patients who have never had neurosurgical procedures.<sup>5</sup>

The indolence of CNS infection with *P acnes* has been well described. In the largest published case series (28 patients),<sup>6</sup> the median time from neurosurgical procedure to infection was 54 days, ranging from 12 days to more than 4 years. In this series, there was an additional description of a patient who presented 38 years follow-

ing a meningioma resection. This patient, who was considered to be an outlier, also had an intracranial abscess at the site of her previous operation. Other case reports and series have described intervals of 18 months<sup>2</sup> and 5 years<sup>3</sup> between intracranial operation and clinical presentation. Our demonstration of a *P acnes* brain abscess appearing within a previous intracranial operative field 10 years after the operation is thus consistent with previous findings, but it extends the timeframe for this appearance (10 years) from all but 1 previously reported case. While no such study involving prolonged postoperative intervals can conclusively prove a cause and effect relationship between intracranial operation and subsequent abscess development, the consistency of our findings with previous reports of *P acnes* infections after prolonged postoperative intervals (albeit less than 10 years) is striking.

Our case and those reported previously raise important considerations for the detection and treatment of *P acnes* infections in postoperative patients. *Propionibacterium acnes* isolates derived from the CNS may display a wider susceptibility profile than those from the skin or eye, perhaps because of less previous exposure to antimicrobials. Susceptibility testing of 24 consecutively collected strains of *P acnes* from CNS sources (13 from subdural empyema, 11 from brain abscesses) found 100% susceptibility to penicillins, cephalosporins, clindamycin, and vancomycin. Consistent with previous studies, there was universal resistance to metronidazole.<sup>7</sup> When culture has been obtained in the absence of prior antimicrobial therapy, penicillin G may be the drug of choice after surgical drainage.<sup>6</sup> For patients with a penicillin allergy, alternatives would be ceftriaxone or vancomycin. If a patient has received antimicrobial therapy prior to obtaining the microbiologic specimen, one should consider coverage for other common pathogens because of the potential for partial sterilization prior to drainage of the collection(s). This was the rationale for the treatment of this patient with vancomycin rather than penicillin G, although the presence of only *P acnes* in both abscesses could argue against partially sterilized polymicrobial infection.

This case illustrates the potential for serious CNS complications from postoperative *P acnes* infections, but also the indolence and potential for delayed diagnosis. The latency to presentation in this case, without other associated risk factors, underscores the importance of considering *P acnes* infections as a potential pathogen in a patient with focal neurologic findings who has a history of an intracranial operation, even years prior to infection detection. Anaerobic cultures from biopsy specimens must be allowed to grow for several weeks to detect *P acnes*, and empirical treatment for *P acnes* should be considered. Because of the susceptibility of *P acnes* to multiple antimicrobials, these infections are curable. Our case supports the response to treatment shown in other series; in the 6 patients described by Kelly et al,<sup>8</sup> 1 had a recurrence of infection, and in the 28 patients described by Nisbet et al,<sup>6</sup> 2 had relapse or reinfection. While there seems to be no true mortality referable to intracranial *P acnes* infections, few articles in the literature have discussed in detail the morbidity associated

with focal neurological deficits due to intracranial abscesses or the recovery of these symptoms after treatment. Our case supports the possibility that with appropriate treatment, even significant neurologic deficits can be recovered.

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