Resolution of an Actinomycotic Abscess with Nonsurgical Treatment: Case Report

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A CASE OF actinomycotic brain abscess is presented. Conservative treatment by prolonged administration of antibiotics after needle biopsy showed complete resolution of the abscess. Previously reported cases suggest that definitive treatment requires excision or open surgical drainage of the abscess. The case presented suggests an alternative approach to treating this unusual cause of brain abscess. (Neurosurgery 32:134–136, 1993)

Key words: *Actinomyces*, Actinomycosis, Antibiotics, Brain abscess

Brain abscess due to *Actinomyces israelii* is rare. In large series of pyogenic abscesses, *Actinomyces* is the etiological agent in < 2% of cases (3, 7, 18, 21). Currently, recommended treatment includes thorough aspiration or total excision of the abscess followed by antibiotics (5, 6, 9, 19). In this report, we present an unusual case of actinomycotic brain abscess that presented with a chest wall mass and was successfully treated with prolonged intravenous and oral antibiotics after diagnosis by needle biopsy.

CASE REPORT

A 60-year-old man presented with a 1-month history of a painful inflamed mass over the left chest wall that had been preceded by a year of pleuritic pain. The patient also described a 2-week history of bumping into objects with his right side. He had a history of chronic ethanol and cigarette abuse.

At his physical examination, he was diaphoretic with a fever of 39.5°C. Over the left anterior superior chest, a mass measuring 14×12×2 cm was evident. The mass was fluctuant except for the superior lateral aspect, which was indurated. His neurological examination was normal, apart from a right homonymous hemianopsia.

A routine laboratory examination yielded the following abnormalities: white blood cell count, 23,000/mm^3 (88% neutrophils, 7% lymphocytes, and 5% monocytes); hematocrit, 31%; albumin, 2.4 mg/dL; and serum alkaline phosphatase 168 U/L. A chest roentgenogram showed a mass in the aortopulmonary window with associated airspace disease in the left upper lobe. The patient was admitted for antibiotic treatment with presumed malignancy-related pneumonia.

A computed tomographic (CT) scan of the head revealed a 3-cm contrast enhancing lesion in the left occipital region with surrounding edema (Fig. 1). A chest CT scan showed a mass measuring approximately 14 cm in diameter that involved the pectoralis muscle superficially and invaded through the chest wall into the left upper lobe of the lung. The mass appeared to have a necrotic center. Lymphadenopathy was seen in the anterior mediastinum (Fig. 2). A CT-guided biopsy of the left chest mass was performed on Day 4 of the patient's hospitalization. Ten milliliters of pus was aspirated, and a biopsy specimen of the wall was obtained. A histopathological examination with Brown-Brenn stain revealed inflammatory cells, sulfur granules, and filaments consistent with either an *Actinomyces* or *Nocardia* abscess (Fig. 3). As a result, intravenous therapy with penicillin G (16 million U/d) and sulfadiazine (1.5 gm/d) was started. A bronchoscopy with washings showed no evidence of neoplastic cells.

Bacteriological cultures, however,

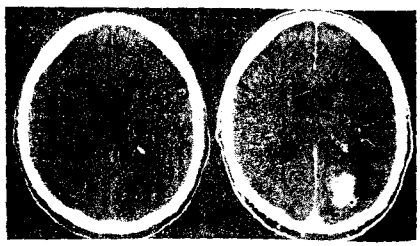
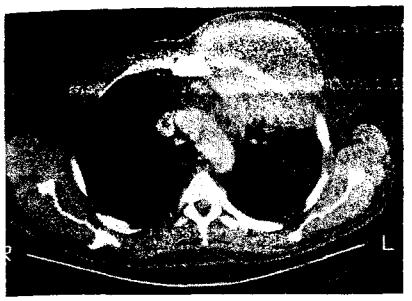


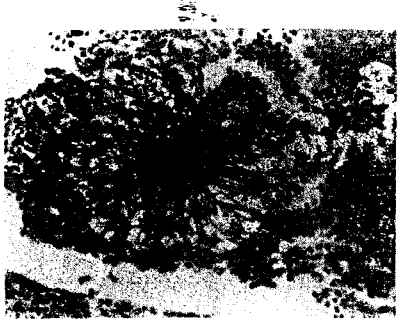
FIGURE 1. CT scans of the head with noncontrast (*left*) and contrast (*right*) enhanced images show a diffusely enhancing lesion, measuring 3 cm, in the left occipital lobe with a moderate degree of surrounding edema.



IGURE 2. CT scan of the chest re-ealed a large mass involving the pec-)ralis muscle superficially and invad-ig through the chest wall into the pper lobe of the left lung.

lowed nothing abnormal after 1 week. needle biopsy of the occipital mass was erformed to definitively exclude central ervous system (CNS) neoplasm. After T localization of the lesion, a twist drill ole was made in the skull under local nesthesia. A 16-gauge ventriculostomy eedle was inserted into the occipital le-on. Gentle aspiration yielded a small -2 ml) quantity of necrotic, semisolid ebris. A histopathological examination vealed perivascular lymphocytic and asma cell infiltrates consistent with ronic inflammation or abscess. Cul-res of the biopsy material yielded *A. raelii*. The administration of sulfadiaz-e was thus discontinued.

Within 2 weeks of starting antibiotic eatment, the patient's white blood cell unt had returned to normal, his visual eld defect had improved to a right in-rior quadrantanopsia only, and a head



GURE 3. Photomicrograph of fluid pirated from the chest wall mass monstrating an actinomycotic or lfur granule. There is a dense core ith a surrounding sunburst pattern of phal elements with some clubbed dings (Brown-Brenn, ×310).

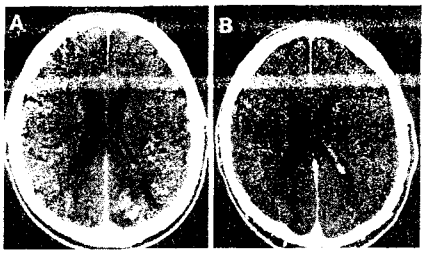


FIGURE 4. Contrast enhanced CT scans at 2 weeks (A) and 6 months (B) show partial and then complete resolution of the left occipital mass.

CT scan showed a decrease in the size of the occipital lesion (Fig. 4*A*). After completing a 4-week regimen of intravenous antibiotics, he was discharged. Oral penicillin VK, 2 gm/d, was given for an additional 5 months. To closely monitor the size of the abscess, monthly contrast-enhanced CT scans of the patient's head were obtained. Complete radiographic resolution of the occipital mass was evident by 6 months (Fig. 4*B*). The patient remained well at a 1-year follow-up without clinical or radiographic evidence of recrudescence. A right inferior quadrantanopsia persisted.

DISCUSSION

A. israelii is classified as a higher bacteria characterized by gram-positive, nonacid-fast, filamentous organisms with anaerobic requirements. The correct diagnosis often requires the demonstration of sulfur granules in the pathological specimen. When these granules are demonstrated, the diagnosis of disseminated *Nocardia* infection can only be excluded after the *Actinomyces* subspecies are isolated in culture. It is possible that many of the first case reports of actinomycotic abscesses were confused with disseminated nocardiosis, as the bacteria were not isolated from the culture (2, 11).

The organism is part of the normal commensal flora of the mouth and gut. In the pathological state, infections may occur in a local or disseminated form. Predisposing factors for dissemination include poor dental hygiene, chronic ethanol abuse, and poor pulmonary function. Although some earlier reports of CNS actinomycosis were unable to define a primary source (8, 14), most cases of CNS involvement are thought to have spread from an extracranial source. The lung, cervicofacial area, and abdomen are the leading sites of primary infective foci, and 10% of patients with systemic actinomycosis have sites of infection that have disseminated from the primary focus. Despite this, only 2 to 3% of patients hospitalized with actinomycosis develop CNS involvement (4, 20). Brain abscess represents most of these cases, although meningitis, ventricular actinomycoma, subdural empyema, or epidural abscess may occur (2, 8, 19).

The first case of CNS actinomycosis was reported in 1882 by Ponfick (15), but it was only in 1949 that the disease was successfully treated (17). A right frontal, parietal abscess, secondary to pulmonary actinomycosis, was managed with total excision and 3 weeks of intramuscular administration of penicillin, followed by an unspecified course of the aerosol administration of penicillin. Although the patient had no evidence of abscess recurrence at an 8-month follow-up, his neurological dysfunction was not improved by the treatment. In our patient, there was improvement in vision that was associated with the disappearance of the lesion on CT scan.

Subsequent case reports have recommended a complete surgical excision or open drainage, followed by the prolonged administration of antibiotics (2, 5, 6, 9, 12, 18). However, the condition remains difficult to manage. A recent review of 70 cases of CNS actinomycosis treated in the antibiotic era showed a 28% mortality. Moreover, 54% of survivors suffered permanent neurological sequelae. Predictors of poor outcome included the following: 1) the appearance of disabling symptoms more than 2 months before hospitalization; 2) no antibiotics; and 3) needle aspiration rather than open drainage or surgical excision (19). Needle aspiration alone has been reported to lead to recurrence after long periods of quiescence (2). However, many of these cases were treated in the pre-CT era.

Just as the introduction of antibiotics reduced mortality from intracranial sepsis, so has the advent of CT scanning (13). Accurate localization and specific diagnosis is now possible. In addition, the response to treatment can be closely monitored. Thus, in some instances,

medical management without formal drainage may be sufficient treatment (1, 16).

Rosenblum et al. (16) suggested that bacterial abscesses less than 2.5 cm in diameter could be handled with antibiotics alone, whereas lesions larger than 2.5 cm should be decompressed surgically. In addition, lesions that do not show radiographic improvement should also be considered for surgical drainage.

As *Actinomyces* is extremely sensitive to penicillin G and large doses have been shown to treat other CNS infections (10), we opted to treat this patient without surgical excision while performing close radiological follow-up. A needle biopsy under local anesthesia was first performed to exclude malignancy and confirm the diagnosis. The patient was then followed closely with weekly CT scans in the first month, and monthly CT scans thereafter for the duration of therapy. A 6-month course of penicillin was given (4 weeks intravenously and 5 months orally). At 1 year, there was no CT evidence of the lesion. With frequent radiological follow-up and the prolonged administration of penicillin, nonsurgical management may be a successful alternate treatment, even for large actinomycotic abscesses. Only if there is no response to needle biopsy and antibiotics would surgical excision then become necessary.

Received, May 7, 1992.
Accepted, July 21, 1992.
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COMMENTS

The authors nicely document the minimally invasive surgical management of an actinomycotic brain abscess. The general principles of managing brain abscess have evolved during the past decade to the point where there are clear guidelines to help the surgeon to determine whether to use minimally invasive or more conventional techniques. These have been suitably outlined by Obana and Rosenblum (1). Basically, patients who are either too ill to undergo a craniotomy or those with relatively small lesions and minimal, nonprogressive neurological deficits can often be successfully managed by craniotomy if their organism is sensitive to an antimicrobial agent that can be delivered to the lesion in bactericidal concentrations.

It is important to emphasize that this is "minimally invasive surgical treatment," rather than "nonsurgical treatment." Accurate and safe diagnosis requires precise imaged-guided lesion biopsy and aspiration, close imaging follow-up, and the capability of providing conventional open surgical treatment if minimally invasive therapy fails to halt progression of the disease. The development of minimally invasive surgical management of brain abscess is not an abdication of surgical responsibility for the treatment of this disease, just a refinement of treatment that minimizes morbidity and maximizes treatment success. The present case documents the ability of these techniques, when carefully applied, to successfully manage abscess caused by another group of organisms.

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The conceptual approach to the management of purulent parenchymal lesions of the brain has been substantially altered with the advent of advanced imaging techniques. The most appropriate therapeutic construct is to avoid major operative endeavors that may require traversing eloquent areas of the brain and instead, using CT-guided needle techniques (with or without a stereotactic frame), obtain a biopsy specimen, culture, and (when appropriate) aspirate the pus. In so doing, the twin goals of establishing the cause and reducing the intracranial pressure are accomplished. If the foregoing measures are successful, an antibiotic regimen can be fashioned that often results in elimination of the lesion, as evidenced by serial computed tomographic or magnetic resonance imaging scans. Even multiple deposits, displaying the classic halo appearance on computed tomographic scans—with proven frank suppuration, may be eliminated by non-

surgical means (3). This current report is of particular interest because the pathogen has been identified as *Actinomyces*—a bacterium not previously known to respond to antibiotics alone when it has produced a brain abscess. One fortuitous aspect in this case was the fact that the process was identified early in its development, i.e., in the septic cerebritis stage, rather than after an identifiable capsule

had formed. Although it has been shown that systematically administered penicillin will diffuse into mature abscess cavities (1), its effectiveness is less predictable than in the cerebritis stage when frank abscess formation can be aborted (2).

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