Nocardia Asteroides Brain Abscess Successfully Treated by Enucleation

Case Report

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Nocardia is an anaerobic, partially acid, fast gram-positive fungus. It is a normal contaminant of soil, water, and grasses, and was first described as a pathogen in animals ("bovine farcy" in cattle) by Nocard in 1888. Since Eppinger's first description of human involvement in 1890, there have been numerous reports of Nocardia infection including over 50 cases with some form of central nervous system involvement.

Although the fungus is capable of initiating disease in the absence of any known predisposing factors, the incidence of infection is significantly higher in patients with debilitating disorders, particularly those receiving corticosteroids and or cytotoxic agents. The over-all mortality in this disease is high, one recent review placing it at 78%. There have been only four documented reports of a Nocardia brain abscess that was cured.

Because survival is rare and the condition is apparently becoming more common, we felt it worthwhile to report our experience with the successful management of a Nocardia Asteroides brain abscess, this being the first case reported in which the diagnosis was established preoperatively.

Case Report

This was the second Veterans Administration Hospital admission of this 54-year-old white, city-dwelling mechanic. He presented with a 6-day history of anorexia, chills, fever, and a cough productive of large amounts of sputum mixed with blood.

A diagnosis of squamous cell carcinoma of the vocal cords had been made 4 months before, and the patient was undergoing radiation therapy to this region at the time of admission. He had received approximately 3,000 r total dose of radiation at this time.

There was a questionable history of sensitivity to sulfonamides. The past medical history was unremarkable as was the review of the systems.

Examination. When admitted July 17, 1967, the patient appeared to be a well-nourished, well-developed man in no distress. Temperature was 96.4° rectally, pulse 100, blood pressure 94/60, and respirations 20. The right pupil was smaller than the left, but both reacted briskly. There were clinical findings of a left lower lobe pneumonia. Neurological evaluation revealed no abnormal signs. Chest x-ray films demonstrated left lingual pneumonia. The hematocrit was 39% and the white blood cell count 12,000, with 85% polys, 9 lymphs, and 6 monos. The remainder of the laboratory work was normal. The sputum culture yielded normal flora; a smear for acid fast bacilli was negative.

The patient was started on Lincomycin, 600 mg three times daily; after 3 days of therapy this was changed to aqueous crystalline penicillin, 600,000 units every 6 hours. He appeared to do well except for x-ray evidence of an extension of the pneumonia process into the posterior segment of the left upper lobe. An intermittent fever of 102° slowly declined after the first 3 days.

On the sixth hospital day, the patient experienced a seizure which began in his right arm and spread to the entire right side. Following this, he had a mild right hemiparesis with a right homonymous field defect and a right extensor plantar response. A lumbar puncture revealed an opening pressure of 140, with clear colorless fluid. There were no cells, the sugar was 75 mg%, the protein 16.8 mg%, and the culture negative. The patient was afebrile at this time, but the pulmonary involvement persisted. The differential diagnoses considered were carcinoma of the lung with cerebral metastasis, or a brain abscess.

Brain scan revealed a left frontoparietal
focus with an abnormal electroencephalogram in this area. During the ensuing week his pulmonary status got steadily worse. Bronchoscopy and biopsy of the main stem bronchus revealed only inflammatory tissue and no evidence of tumor cells.

At this point the patient developed a left hip abscess which, on culture, yielded a heavy growth of Nocardia asteroides. He also developed pleural effusion, which was tapped but yielded no growth. He began to spike a temperature to 103° daily. With the institution of gantrisin 9 gm daily, however, his temperature gradually fell over a 5-day period, with resolution of the pneumonic process.

The sulfonamide was started in spite of his known sensitivity because of his continued deterioration under penicillin therapy. During this time, he developed several additional hip and thigh abscesses which also, on drainage, yielded Nocardia asteroides.

The above regimen was continued with apparent gradual improvement until September 11, when the patient had a generalized seizure with a residual marked right spastic hemiparesis, right visual field defect, and aphasia. A lumbar puncture revealed crystal clear fluid under normal pressure with 2 lymphocytes, a sugar content of 82 mg%, and a protein content of 38.5 mg%. Left carotid arteriography revealed a slight depression of the middle cerebral group of vessels with no shift of the anterior cerebral vessels. The patient was followed closely during an effort to improve his general physical status in anticipation of surgical treatment of what was presumed to be a Nocardia abscess.

Over the ensuing 6 weeks the patient showed marked improvement in his general physical condition, with gain in weight, clearing of the chest and return to a normal white count. Repeated brain scan showed no change in the lesion, and numerous lumbar punctures were normal. The neurological deficit remained, however, and the patient subsequently had two additional seizures which left him with a global aphasia in addition to right hemiparesis. Repeat left carotid arteriography revealed marked displacement of the anterior cerebral across the mid-line with depression of the middle cerebral group.

Operation. The patient was transferred to the neurosurgical service on December 11, 1967, and underwent a left frontoparietal craniotomy on the following day. A large 8 × 6 × 3 cm, well-encapsulated, multiloculated abscess, was excised in toto (Fig. 1). The abscess lay 3 cm below the cortex, with its most anterior tip at the level of the motor strip; it extended posteroinferiorly toward the supramarginal gyrus. The remaining cavity left by the removal of the abscess was irrigated with copious amounts of gantrisin solution (20 mg%); the bone flap was replaced and the wound closed without drainage.

Postoperative Course. The patient's recovery was entirely uneventful. The sulfonamide therapy was discontinued in April, 1968. At present (9 months after operation) the patient has improved to the point where he is able to walk using a cane. He is at home but has not been able to return to work. There is evidence of return of motor function in his right arm, the proximal muscle groups being somewhat stronger than the distal. He is able to speak in full sentences, although the cadence is somewhat slow; he is able to read quite well.

FIG. 1. Enucleated abscess prior to sectioning (top) and with largest of loculated cavities opened (bottom).
Discussion

Although Nocardia was first described as a human pathogen when it was isolated in a brain abscess,8 Nocardiosis of the central nervous system is most frequently secondary to pulmonary involvement. Neurological involvement is found in 30% of patients with disseminated infections, generally presenting signs and symptoms of an expanding mass.10 Meningitis is uncommon in the absence of contiguous abscess, although cases of meningitis,12 cranial osteomyelitis,11 and spinal cord abscess and compression24 have been reported. Because of its association with underlying diseases, particularly in the presence of a known malignancy, the evolution of the picture of an intracranial mass lesion may well suggest the erroneous diagnosis of metastatic disease as the underlying cause.

Jacobson and Cloward14 in 1948 described the first patient to survive central nervous system infection with Nocardia Asteroides, a case of Nocardia meningitis that responded to sulfonamide administration. In 1954, Krueger, et al.,16 reported the first documented patient with Nocardia brain abscess to survive. Their patient, with a history of chronic pulmonary disease, had a preoperative diagnosis of metastatic pulmonary carcinoma; but they had fortuitously begun the patient on preoperative antibiotic coverage because of his chronic lung disease. That same year List, et al.,17 and Munslow18 reported single cases in which a Nocardia Asteroides brain abscess had been cured. In each was treated by formal craniotomy with the time of surgery or postoperatively; each was treated by formal craniotomy with extracapsular enucleation and without prior needle aspiration of the abscess.

In our case, in which the diagnosis was established preoperatively, we were able to treat the patient systemically with the appropriate chemotherapeutic agent and were also able to define an agent for topical irrigation at the time of surgery. Nocardia Asteroides is generally resistant to penicillin and usually highly sensitive to sulfonamides. In addition, it has been shown at times to be sensitive to streptomycin, chloramphenicol, and tetracycline. In our case, preoperative studies established the sensitivity of the organism to sulfasuxisole, and we consequently used this agent for topical irrigation following removal of the abscess.

The nature of the surgical therapy of a Nocardia brain abscess is particularly important. The lesion is usually a multiloculated structure that results from the coalescence of multiple daughter abscesses and may or may not be surrounded by a thick-walled capsule.10 Because of this structural arrangement, we believe that this lesion should be attacked directly by craniotomy and an attempt made at extracapsular enucleation. Munslow suggests other alternatives.18 Needle aspiration of such a lesion might easily be inadequate for definitive therapy, and in addition might further spread the organisms throughout the cerebrospinal fluid or into contiguous areas of brain. Turner22 described an abscess that he aspirated through a burr hole prior to craniotomy, with drainage of the wound; in spite of apparent total excision the patient subsequently developed a second abscess in the brain adjacent to the area of excision, with ultimate death due to spread of the infection through the meninges to the skin incision. The increasing use of corticosteroid and cytotoxic agents may lead to an increased incidence of Nocardia infections with the associated neurological involvements.

Summary

We have presented a case of Nocardia Asteroides brain abscess, diagnosed preoperatively and treated successfully by craniotomy, total en bloc enucleation, and sulfonamide therapy. A review of the literature as well as the pathology suggests that this form of therapy may be superior to repeated aspiration.

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References

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