Actinomycotic subdural empyema

Case report

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The authors report a case of a subdural empyema caused by the organism Actinomyces israelii. The clinical course is outlined and the pathophysiological mechanism is discussed.

Key Words: subdural empyema • actinomycosis • brain infection

Actinomycosis is a noncontagious, suppurative, bacterial infection characterized by chronic inflammatory induration, sinus tract formation, fever, and leukocytosis. The diagnosis of this disease is often hampered by the failure of laboratory cultures to demonstrate the infectious agent. Actinomyces israelii is responsible for the majority of human infections. Once known as the “ray fungus,” A. israelii is actually a Gram-positive, non-acid-fast, anaerobic eubacterium. Its prokaryotic ultrastructure and mycelial pattern of growth places it intermediately between the classical bacteria and the higher fungi. In up to 30% of actinomycotic lesions, a synergistic organism, Actinobacillus actinomycetemcomitans, is also isolated.

Lesion complexes in this disease are primarily cervicofacial, thoracic, and abdominal. Although involvement of the central nervous system (CNS) is considered rare, various authors have reported CNS infection in less than 1% to as high as 15% of all cases. This paper presents the first report of a nontraumatic actinomycotic subdural empyema known to the authors.

Case Report

This 59-year-old man was admitted to the hospital on January 30, 1977, with complaints of severe frontal headaches for 1 week, and lethargy for 1 day. His symptoms began 5 weeks before admission, when he developed left-sided chest pain and a nonproductive cough. Four weeks prior to admission, he saw a physician because he had developed nodular skin lesions in the left inguinal region. No specific treatment was instituted at that time. Within 3 weeks, however, the patient noted the onset of the frontal headaches. There was no history of trauma or predisposing medical illnesses.

Examination. Physical examination revealed that the patient had a temperature of 39°C, a blood pressure of 114/70, and a pulse of 88. He was disoriented to time, place, and person, and was sleeping most of the time. He could be awakened with verbal stimuli. He had numerous carious teeth and multiple violaceous, fluctuant, firm skin lesions about 2 cm in diameter over the right posterior aspect of the neck, the abdominal wall, the left chest, the left inguinal region, and the left side of the face; one lesion ruptured spontaneously, draining purulent exudate. There were widespread pulmonary rales and a systolic ejection murmur. Focal neurological findings included a left facial weakness, a left hemiparesis, and a left homonymous hemianopsia. No neck stiffness or papilledema was noted.

Laboratory studies demonstrated a peripheral leukocytosis with 14,300 white blood cells, predominantly polymorphonuclear leukocytes (PMN). A left upper lobe infiltrate was present on chest film, but skull films were normal. Lumbar puncture disclosed an opening pressure of 250 mm H₂O with a glucose of 79 mg % (blood glucose 160 mg %),
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FIG. 1. Right internal carotid arteriogram, arterial phase (left) and venous phase (right), showing the characteristic saucer-shaped avascular area of a subdural empyema (arrows).

protein 112 mg % and 120 cells/cu mm (10% PMN and 90% lymphocytes). Cultures of the cerebrospinal fluid, including fungal, tuberculous, and bacterial, were negative. The initial diagnosis, based on these findings and on Gram stains of the sputum, was probable diplocoecal pneumonia and meningitis.

Preoperative Course. Aqueous penicillin therapy, two million units intravenously every 2 hours, was initiated. The patient developed a stiff neck despite treatment. An electroencephalogram demonstrated right frontotemporal slow waves, and a brain scan revealed an increased uptake of technetium-99 over the right hemisphere. Within 48 hours of admission, Gram-positive filaments (mycelia) were aspirated from a shoulder abscess. These findings suggested the diagnosis of disseminated actinomycosis with possible subdural or epidural infective process over the right cerebral convexity. The penicillin was supplemented with parenteral chloramphenicol. Oral sulfamethoxazole and trimethoprim were administered for 5 days and then discontinued when subculture confirmed the diagnosis of anaerobic actinomycosis.

Four days after admission, the patient's mental status deteriorated and his hemiparesis progressed. A carotid angiogram (Fig. 1) showed a crescent-shaped, avascular region in the right frontal region, pathognomonic of an extracerebral mass. The patient's neurological status remained stable for approximately 5 days. Suddenly, within a period of 1 hour, he became unresponsive, the right pupil became fixed and dilated, and he exhibited left-sided decerebrate rigidity and right-sided decorticate posturing. Intravenous mannitol was administered and a twist drill hole was placed in the right posterior frontal region. Aspiration demonstrated a subdural collection of pus.

Operation. The patient was taken to the operating room and underwent a right frontotemporal craniotomy. When the dura was opened, a thick purulent collection of pus exuded from the subdural space. An adherent membranous exudate was observed over the cerebral convexity; there was no evidence of medial extension to suggest involvement of the interhemispheric fissure. The brain was erythematous and swollen. Following aspiration of the pus, the dura was folded over the exposed cortex but not closed, and the bone flap was not replaced.

Postoperative Course. The patient made a rapid neurological recovery with only a mild residual left hemiparesis. Cultures of the subdural space and skin lesions grew *Actinomyces israelii* and *Actinobacillus actinomycetemcomitans*. Three days postoperatively, the patient's hematocrit began to fall and he developed a leukopenia. Because of this the penicillin and chloramphenicol were discontinued; tetracycline, 500 mg every 6 hours, was started. He was discharged from the hospital on March 25, 1977, on oral tetracycline.

Cerebrospinal fluid specimens, obtained subsequent to the patient’s discharge, continued to demonstrate a
pleocytosis and elevated protein. The patient was readmitted to the hospital; the tetracycline was stopped and erythromycin, 1 gm every 6 hours, intravenously and then orally, was administered over a 5-week period. A computerized tomogram (CT) during this second hospitalization did not demonstrate any abscess formation or recurrence of the subdural empyema. A repeat lumbar puncture on May 20, 1977, was normal. In late 1977, the patient was doing well with only mild left hemiparesis and hyperreflexia, and in February, 1978, a cranioplasty was performed to repair the skull defect.

Discussion

Actinomycosis is now a well defined clinical entity in man. The literature, however, has been complicated by inadequate microbial identification and confusion with the aerobic infection Nocardia. Involvement of the CNS was considered universally fatal before the advent of chemotherapy. In 1949, the successful total excision of an actinomycotic brain abscess was reported. Today, surgical aspiration or excision of such intracranial infections, when combined with high-dose penicillin therapy, is recognized as the basis of successful treatment. Nevertheless, disseminated actinomycosis is often fatal, even if correctly diagnosed and treated; and bacterial subdural empyema, from all sources, still carries an overall mortality between 15% and 42%.2,3,10-25 There have been sporadic reports of primary CNS disease, but these findings have been questioned.

We have presented a case of disseminated actinomycosis with an actinomycotic subdural empyema. Our case probably involved hematogenous dissemination from a pulmonary focus. In the other reported case, the subdural infection was precipitated by trauma. In that instance a different organism, Actinomyces bovis, was isolated. That case most likely represented direct, traumatic extension by a bone-invading organism. Although often grouped with the fungal infectious agents, Actinomyces is a true bacterium. An infection by this organism in the subdural space presented as a typical example of bacterial subdural empyema.

References


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