BRAIN ABSCESS CAUSED BY NOCARDIA ASTEROIDES

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Although as late as 1945 infections of the central nervous system with Nocardia asteroids were considered rare, an increasing number of cases both of metastatic involvement from pulmonary disease and occasionally of primary infections are being reported. This is of interest to the neurosurgeon since brain abscess is said to be a complication in from one-third to one-half of the cases in which the primary infection is in the lung. As in Actinomyces bovis almost any part of the body may be involved, but Stevens in the most recent review of the subject pointed out that Nocardia, while rare, is more virulent, spreads by the hematogenous route, and is more likely to involve the central nervous system.

Only occasional cures of brain abscess have been reported. The organism is a Gram positive aerobic fungus which is generally considered to have some sensitivity to the sulfonamides, but a considerable variability exists in individual cases in the response both to the sulfonamides and antibiotics. With the use of chemotherapy and antibiotics as an adjunct to surgery, it seems worthwhile to record additional experiences.

CASE REPORTS

Case 1. A 15-year-old boy was first admitted on Oct. 6, 1950. Two weeks previously, his left arm and leg had suddenly become numb and his left leg would not support his weight. These symptoms lasted only a few hours, but were followed by frontal headache, more severe on the right. The headaches became increasingly severe and 4 days after onset he had episodes of vomiting, lethargy, and drowsiness. Intermittent diplopia developed, and 2 days before admission he had his first generalized convulsive seizure.

Past history was not remarkable; he had been in good health with no history of ear infection or pulmonary disease. He was right-handed.

Examination. Temperature was 97.6, respiratory rate 18 per min., pulse 64 per min., and B.P. 108/70. He was well nourished but so drowsy that at times it was difficult to obtain any verbal response. He had bilateral papilledema of the optic disc of 3 D. on the right and about 1 D. on the left. There were fine nystagmoid movements on lateral gaze, and definite weakness of the right internal rectus muscle with difficulty in fixing the eyes in full adduction. He had a mild left hemiparesis, greater in the lower extremity. Movements of the left upper extremity were extremely awkward and in the finger-to-nose test he had considerable dysmetria. There was unsustained ankle clonus on the left and a marked Babinski sign. Severe nuchal rigidity was present. The sensory disturbance was that of a hypesthesia which involved the entire left side of the body including the face.

X-rays of the skull revealed no significant abnormality. X-rays of the chest disclosed a few minute calcifications in the upper third of the right lung with no evidence of active disease. Urinalysis was normal. He had a mild leukocytosis and the blood serology was negative.

Operation. On the day after admission ventriculography was done and a large abscess cavity in the right parietal region was entered at a depth of 4 cm. Twenty cc. of greenish-yellow pus were removed and 3 cc. of pantopaque introduced before withdrawal of the needle. A small bone flap was reflected in the right superior parietal region. The exposed brain had some pallor but was not otherwise unusual. A thick-walled abscess was easily enucleated through an incision in the cortex, the adjacent brain being relatively avascular (Fig. 1).

Course. The drains were removed in 44 hours, and the wound healed well without evidence of infection. He continued to have increased intracranial pressure and on Oct. 21, 1950, 2
weeks after operation, the spinal fluid pressure was still between 300 and 400 mm. of water. At the time of discharge from the hospital on Nov. 8, 1950, there was still mild papilledema and the bone flap was slightly elevated.

*Bacteriological Studies.* A stain of the pus obtained at operation disclosed a very occasional Gram positive small bacillus but no other organism. The culture was sterile for bacterial growth but a fungus grew out on incubation at room temperature. An acid-fast stain of the pus disclosed no tubercle organism. The fungus isolated from the culture was sent to Dr. David T. Smith at Duke University and was reported as Nocardia asteroides. At the suggestion of Dr. Smith, sulfamerazine therapy was started with blood levels maintained between 14 and 18 mg. per cent.

*Pathological Report.* The abscess measured 4.5 cm. in diameter and had a thick, well formed capsule (Fig. 1). The wall of the abscess was composed mainly of mature fibrous tissue with areas showing various stages of organization of fibroblasts and capillaries. There were numerous foci of acute inflammation outside of the wall, these being composed of neutrophilic leukocytes, and some lymphocytes and plasma cells (Fig. 2).

*Course.* The patient continued to show evidence of infection, with progressive papilledema, episodes of numbness and tingling of the entire right side of the body, and finally spontaneous vomiting.

2nd Admission, Nov. 18, 1950. Pneumoencephalography was done with the introduction of 60 cc. of filtered helium. The right ventricle was quite small, with the gas confined to the posterior portion of the body and temporal horn. The left ventricle showed good filling with no significant distortion of the midline structures. At this time the spinal fluid pressure was 385 mm. of water, and the fluid was quite clear and colorless.

3rd Admission, Dec. 20, 1950. There was papilledema of from 4 to 5 D. with numerous retinal hemorrhages in both fundi. He had slight facial weakness on the right, a fanning response on plantar stimulation on the right, and the bone flap was elevated more than it had been.

Aspiration through one of the previously placed trephine openings yielded 4–5 cc. of pus and on Dec. 23, 1950, the bone flap was removed. The dura mater was opened, with exposure of a large abscess which had formed in the cavity from which the previously encapsulated abscess had been removed. There was no definite capsule, and drainage was established through a stab-wound in the scalp.

Up to this time the patient had been receiving sulfamerazine, maintaining a blood level of from 10–11 mg. per cent. Because of lack of response, the medication was changed to sulfadiazine in large amounts, with a blood level which reached 20 mg. per cent on one occasion.

On Jan. 2, 1951, there was seen the first evidence of spread of the infection with the development of progressive lymphadenopathy in the cervical region. The wound, which had been healing well, began to break down and multiple sinuses appeared along the suture line. The dissolution of the suture line was progressive with the development of a large cerebral fungus. Mycelia could be identified in smears from the surface of the protruding granulomatous mass. Aspiration of the cerebral fungus again localized an abscess.

4th Admission, Jan. 20, 1951. The granulation tissue over the abscess was incised with the