Tuberculous brain abscess and its appearance on computerized tomography

Case report

ELI REICHENTHAL, M.D., MATHIAS L. COHEN, M.B, CH.B., ELIAS SCHUJMAN, M.D., NACHMAN EYNAN, M.D., AND MORDECHAI SHALIT, M.D.

Departments of Neurosurgery, Anesthesiology, and Pathology, Beilinson Medical Center, Petah Tiqva, and Tel-Aviv University, Sackler School of Medicine, Tel-Aviv, Israel

A case of tuberculous brain abscess in a 52-year-old woman is presented. The computerized tomographic (CT) scan demonstrated a multilocular space-occupying lesion in the right parietal area, surrounded by a thick hyperdense enhancing rim. It is suggested that a relatively long clinical history together with the appearance of a thick-walled abscess-like lesion on the CT scan may indicate the diagnosis of a tuberculous brain abscess.

KEY WORDS: tuberculosis, brain abscess, computerized tomography

SINCE the introduction of streptomycin for the treatment of tuberculosis in 1944, the incidence of tuberculous cerebral lesions has declined significantly. Reports of tuberculous brain abscess, as opposed to the more common tuberculoma, are rare. Only 19 such cases have been documented in the literature, with only five survivals. Tyson, et al., in their case report of a tuberculous brain abscess, suggested that there is little convincing evidence for a definite separation between tuberculous brain abscess and brain tuberculoma, and that they are histological variants of the same pathological process. Leblanc's case report of a patient with a cystic pus-filled abscess in the left cerebellar hemisphere and a solid tuberculoma in the right cerebellar hemisphere serves to confirm the above contention by demonstrating both ends of the pathological spectrum.

We report an additional case that fulfills the diagnostic criteria of a tuberculous brain abscess, as laid down by Evans and Smith and Whitener, in which pre- and postoperative computerized tomographic (CT) scans were performed. The patient made a good recovery following operation and antituberculous therapy.

Case Report

This 52-year-old woman was admitted to our institution on December 12, 1978, for the investigation of a left hemiparesis. One month prior to her admission, she had immigrated to Israel from Rumania. Five years previously, she had first begun suffering from weakness of her left arm, which slowly increased in severity; 1 month before her admission, she noticed weakness of her left leg as well. She had suffered from increasing headaches for the previous 4 years and had also experienced transient attacks of numbness over the left side of her face and left hand, which increased in frequency in the 4 weeks prior to her admission. In this same 4-week period, she had also noted an impairment of vision in both eyes. She stated that apart from the above-mentioned neurological symptoms, at no time had she suffered from any significant pulmonary or other disorder.

Examination. General physical examination on admission revealed no abnormal findings. Neurologically, she was alert and normally oriented; a severe left spastic hemiparesis and a left central facial palsy were noted. Funduscopic examination showed bilateral papilledema, more pronounced in the right eye. No other neurological abnormalities were apparent.

Routine hematological and biochemical tests were within normal limits. The plain x-ray films of the skull and chest were found to be normal. A technetium-99 brain scan demonstrated an increased right
FIG. 1. Computerized tomography scans on the day of admission, before (left) and after (right) contrast infusion. A multiloculated thick-walled lesion is visualized in the right parietal lobe, with considerable surrounding edema.

frontoparietal uptake, suggestive of a space-occupying lesion. A CT scan, before intravenous contrast administration, showed several low-density areas in the right parietal region. Marked brain edema surrounded the lesion and extended anteriorly to the frontal and posteriorly to the occipital regions. After intravenous contrast medium administration, a homogeneous ring-like enhancement was seen encircling the low-density area. The right lateral ventricle was compressed, and subfalcx herniation from right to left was present (Fig. 1). Preoperative treatment with dexamethasone, 16 mg/day, resulted in prompt remission of her headache and also some improvement in the weakness of her left arm and leg.

Operation. A right parietal craniotomy was performed 2 days after admission. The cortex over the right parietal area showed flattening of the gyri, and a small grayish area, 1 × 1 cm, was noted, clearly demarcated from the surrounding cortex. An attempt at inserting a brain cannula through the grayish area toward the underlying lesion met with a rubber-like resistance, so this grayish area was dissected free with a bipolar coagulator. During dissection, an abscess cavity, 0.5 cm below the cortex, was entered with a gush of white odorless pus; this was aspirated into a syringe and measured 12 ml. A second abscess cavity, adjacent to the first, was then encountered and this contained 8 ml of a similar pus. The entire lesion was then excised.

The pus was sent for bacteriological and pathological examination. Intraoperative stains of the pus demonstrated acid-fast bacilli, and culture subsequently grew Mycobacterium tuberculosis on Lowenstein-Jensen medium.

Pathological examination of the excised abscess showed a thick wall of fibrous tissue measuring 4 to 5 mm, epithelioid cells, and giant cells of the Langhans type. Toward the inner surface of the abscess wall, large numbers of M. tuberculosis bacteria were present (Fig. 2).

Postoperative Course. A postoperative search for additional tuberculous foci was carried out; no evidence of tuberculosis was found in the lungs, bones, or lymph nodes. Antituberculous therapy was commenced immediately after the operation, the patient receiving ethambutol 1 gm, rifampin 600 mg, and isoniazid 300 mg/day for 12 months. During the postoperative course, a gradual improvement was noted in her neurological condition; the papilledema resolved and her hemiparesis improved. She was discharged to a rehabilitation center 3 weeks after operation. When the patient was last seen on April 22, 1981, she still had a mild left hemiparesis but was walking unaided.
Discussion

In 1978, Whitener\(^1\) reported a case of tuberculous brain abscess and reviewed 57 similar cases in the world literature. He found that only 16 of the 57 cases could be considered as verified tuberculous brain abscesses in terms of the following three criteria: 1) macroscopic evidence of abscess formation within the brain parenchyma; 2) histological confirmation that the abscess wall was composed of vascular granulation tissue, containing acute and chronic inflammatory cells; and 3) bacteriological proof of the tuberculous origin.

Evans and Smith\(^2\) and Rand\(^7\) postulated that the histology of tuberculous brain abscess indicates that these lesions are more closely related to pyogenic brain abscesses than to tuberculomas. Many authors have emphasized the difficulty in differentiating between tuberculous and pyogenic brain abscesses and tuberculomas by the use of conventional neuroradiological techniques, prior to the advent of CT scanning.\(^8,10\) The more detailed information concerning the morphological characteristics of mass lesions in the brain provided today by CT should, however, enable us to suggest the correct preoperative diagnosis with a greater degree of probability. On the CT scan, both pyogenic and tuberculous brain abscesses show a rim of greater than normal density, surrounding an elliptical or round center of low density, and the whole lesion is encircled by a low-density area of brain edema. The vascular nature of the abscess wall is reflected in the marked enhancement that appears after infusion of the contrast medium.\(^3,4\)

Tuberculous brain abscess is presumed to result from the caseation of a tuberculomatous focus followed by softening of the caseum and eventual pus formation due to polymorphonuclear infiltration.\(^10\) The wall of the abscess cavity is composed of a necrotic inner surface and a fibrous outer surface associated with an inflammatory reaction, consisting of lymphocytes, mononuclear cells, and giant cells with tubercle formation on the inner surface.\(^8\)

In contrast to the majority of pyogenic brain abscesses, the slower evolution of the tuberculous lesion can be expected to result in a far thicker abscess wall. This is borne out by several descriptions of the intra-operative and necropsy findings in cases of tuberculous brain abscess.\(^1,6,9\) All these authors emphasize the presence of a thick abscess wall; in Tyson's case,\(^9\) the capsule was approximately 0.5 cm thick and could not
be penetrated with a brain cannula. While some pyogenic brain abscesses may have developed over a sufficiently long period to form a thick capsule, the CT picture of pyogenic brain abscess generally shows a thin rim of higher than normal brain density surrounding a central area of low density. Apart from the single case reported by Leblanc, we have, to date, been unable to find any other published account of the CT appearance of a tuberculous brain abscess. The CT appearances of both Leblanc's case and ours are noteworthy for the thickness of the hyperdense rim corresponding to the abscess capsule. While it would be unwise to generalize from the findings in only two such cases, in view of the acknowledged rarity of tuberculous brain abscess, we should like to stress this particular point concerning the width of the lesion's rim on CT scanning, and would urge that, as further such cases come to light, heed be paid to this detail to either confirm or refute the above observation.

Inasmuch as a relatively long clinical history together with the CT appearance of an abscess-like lesion having a particularly thick capsule may indicate the possibility of a tuberculous brain abscess, we would suggest that, when confronted by this constellation of symptoms and signs, the pus be examined intraoperatively for \textit{M. tuberculosis}. Such intraoperative confirmation of the etiology, as was possible in our case, enables antituberculous treatment to be started immediately and may thereby reduce postoperative morbidity.

References


Manuscript received July 6, 1981.
Accepted in final form November 2, 1981.
Address reprint requests to: Eli Reichenthal, M.D., Department of Neurosurgery, Beilinson Medical Center, Petah Tiqva, Israel.