Giant calcified and ossified midbrain tuberculoma

Case report

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A case of a giant calcified midbrain tuberculoma is presented. Although clinically the diagnosis of tuberculoma was suspected, the conclusive diagnosis could not be established before autopsy. Autopsy findings revealed an ossified and healed tuberculoma. The clinical and pathological findings are discussed.

KEY WORDS - tuberculoma - calcification - midbrain tumor

Although the incidence and severity of all forms of tuberculosis have been reduced by improved standards of living, vaccination, early diagnosis, and modern therapy, tuberculosis continues to be an endemic disease in some parts of the world. The most common form of intracranial tuberculosis is tuberculous meningitis. However, involvement of the brain may take the form of a solid granulomatous mass, a tuberculoma, or an abscess. The incidence of intracranial tuberculoma varies from country to country, ranging between 0.5% and 30.5% of all brain tumors. Among the 1492 cases of intracranial tumors which were operated on in the Hacettepe University Medical Center between 1970 to 1979, there were only 10 intracranial tuberculomas, an incidence of 0.7% (approximately one case per year). We wish to report one of these cases, which had unusual clinical, radiological, and pathological features.

Case Report

This 35-year-old white male shepherd was brought to the hospital after having been discovered lying unconscious on the road. Because he lived alone and had no other relatives, information obtained about his present collapse was scanty. Two months earlier, he had fallen unconscious while crossing a street, and had since suffered weakness of the legs, loss of hearing, and bladder incontinence. No other information was obtainable about past and family history.

Examination. Neurological examination on admission revealed a confused, afebrile patient. His speech was dysarthric. Optic fundi and visual fields were normal. He had upward gaze paralysis and right lower facial weakness. There was bilateral sensorineural deafness. Other cranial nerves were intact. Deep tendon reflexes were increased in all four extremities, and he had spastic quadriaparesis, more marked on the right side. Abdominal reflexes were absent. The plantar reflexes were extensor, and there was bilateral ankle clonus. Cerebellar testing could not be performed.

Laboratory investigations revealed a hemoglobin level of 15.1 gm/dl, a white cell count of 4800/cu mm, and an erythrocyte sedimentation rate of 8 mm in 1 hour. Chest radiograms showed no definitive abnormalities, and the skull films showed a densely calcified round midline mass with a diameter of 3.5 cm located in the upper part of the brain stem (Fig. 1). Electroencephalography revealed bilateral paroxysmal slow-wave activity. Right brachial arteriography and air ventriculography disclosed an avascular brain-stem mass lesion, with marked hydrocephalus. A technetium-99m brain scan revealed an area of increased uptake in this region. Pantopaque ventriculography showed complete obstruction of the Sylvian aqueduct, which was displaced to the right. Cerebrospinal fluid was clear, and opening pressure and constituents were normal. Computerized tomography was not available at that time.
FIG. 1. Anteroposterior (left) and lateral (right) roentgenograms of the skull showing a densely calcified round midline mass in the upper brain stem.

FIG. 2. Sagittal section of the brain showing the large ossified tuberculoma in the midbrain.

Course. The patient was treated with a ventriculoatrial shunt and anticonvulsant drugs. He improved slightly with these measures, and physiotherapy exercises were begun. His condition remained unchanged for several months. One year later he died of septicemia after being unconscious for 1 month.

Postmortem Examination. There was evidence of active tuberculosis in the lungs, masked by lobar pneumonia. In addition, active tuberculous infiltration was observed in the mesenteric lymph nodes. Some nodes were also calcified and ossified. The convolutions over the surface of cerebral hemispheres were moderately flattened. The brain was sectioned sagittally through the corpus callosum and brain stem. The third and both the lateral ventricles were markedly dilated. In the midbrain, there was a large irregular firm grayish-white mass which was sharply circumscribed, and extended from the cerebral peduncles to the inside of the third ventricle superiorly, to the optic chiasm anteriorly, and to both temporal lobes (Fig. 2). On cross section, the mass measured 5 cm in its greatest diameter. In the center of the mass, there was an area of caseation necrosis. This necrotic zone was surrounded by multiple calcified and ossified areas. On microscopic examination, those formations were seen to be composed of a fusion of many small individual crystals of calcareous salts, embedded in a hyalinized connective tissue scar. In the ossified area was bone marrow tissue. No definite evidence of tuberculous granulomatous formation remained. The surrounding brain tissue showed only a loose glial scar.

Discussion

This case of tuberculoma was unusual in regard to its location, size, and radiological and pathological characteristics. The midbrain is not a common site for intracranial tuberculomas, which are found in the pons in 10% of autopsied cases, and (with almost equal frequency) in the cerebellum and the cerebral hemispheres in the remainder. They have been reported in the brain stem in 4.3%, 3.1%, 1.7%, and 0% of tuberculoma cases. This was the only lesion located in the brain stem among 10 tuberculoma patients who were seen in the past 10 years in our institution. Of the other tumors, seven were located in the cerebellum and two in the cerebrum.

The size of cerebral tuberculomas is quite variable, and they can be either the smallest or the largest of brain tumors. In most instances their diameter ranges from a few millimeters to 3 or 4 cm. The largest one reported occupied an entire half of one hemisphere. Cerebellar tuberculomas are also quite variable in size. In one case of Dastur and Desai, the
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tuberculoma occupied the entire cerebellum, and in three others it was the size of a walnut. There were also lesions as big as a hen's egg or a golf ball. In our patient, the tuberculoma occupied almost the entire midbrain, which is quite exceptional to our knowledge.

It is unusual to see calcification of a tuberculoma on plain skull radiographs; the incidence has been reported as varying from 0% to 6%. Before the era of antibiotics, most cases with tuberculous meningitis ended fatally. Occasionally, the progression of a tuberculoma is halted spontaneously, and calcification of the lesion occurs.4 The true frequency of spontaneous healing with or without calcification remains unknown. More recent statistics indicate the rarity of calcification in confirmed tuberculomas; it has been suggested that spontaneous healing is exceptional.5 Our case almost certainly represents a spontaneously healed tuberculoma, and autopsy findings confirmed our belief.

Regressive changes in tuberculoma of the brain may be followed by deposition of calcium or formation of bone. It is obvious that calcification is more common than ossification, and probably precedes it. Possibly some unknown stimulating effect of the calcium on the connective tissue favors metaplasia of connective tissue cells into osteoblasts.8 Occasionally, calcification is only a postmortem finding, and is not visualized on the x-ray films.4

Evidence supporting the diagnosis of tuberculoma in our patient was the demonstration of a large round calcification on the plain skull films. An irregular broken calcareous shell is characteristic of a tuberculoma, and such calcifications are referred to as the "lobulated" type. However, a large calcification, 1 to 3 cm in diameter, which is dense and jagged at the periphery and radiolucent in the center, may also resemble a glioblastoma.4

The clinical symptomatology of intracranial tuberculomas is rarely distinguishable from that of other space-occupying mass lesions,1,3-4,6-10,12-14,16-19 and tuberculoma of the brain can be suspected prior to surgery or autopsy only by correlating the clinical picture with the x-ray and laboratory findings,4,9-11,16

Although we suspected the presence of a tuberculoma in our patient, failure to demonstrate any active tuberculosis elsewhere in the body on admission made the diagnosis a difficult one, and he was not placed on anti-tuberculous therapy. Taking the location of the lesion into account, no direct surgical approach was planned, and a ventriculocardioal shunting procedure was performed. The conclusive diagnosis was made after the autopsy.

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References


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