



Case Report

Cerebral Infarction as the First Presentation of Tuberculosis in an Infant: A Case Report

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The case of a child admitted to hospital with acute onset of hemiparesis and seizure is presented. Extensive evaluation of an acute ischemic event in the form of a brain infarct found on brain magnetic resonance imaging was inconclusive. Two months later, the patient was referred with severe hydrocephalus, which was managed with ventriculoperitoneal shunting in the presence of normal ventricular cerebrospinal fluid. The shunt was complicated by distal end infection. During the insertion of a second shunt, and after 3 months of antibiotic therapy, peritoneal thickening was found. Peritoneal biopsy showed evidence of a granulomatous reaction. This finding, along with positive polymerase chain reaction of the cerebrospinal fluid, confirmed tuberculosis. The patient recovered from most of his symptoms after antituberculous therapy, and a new ventriculoperitoneal shunt was inserted. This is a very peculiar presentation of tuberculosis that began with a cerebral infarction due to vasculopathy and hydrocephalus without any constitutional symptoms, and was later confirmed by peritoneal pathology.

KEYWORDS: hydrocephalus, infarction, tuberculous meningitis

Introduction

Tuberculosis still ranks as one of the most important communicable diseases in terms of morbidity and mortality. Central nervous system (CNS) involvement is evident in

approximately 10–15% of all tuberculous infections.¹ Tubercle bacilli can affect the CNS in various ways resulting in tuberculous meningitis (TBM), serous meningitis, tuberculoma, tuberculous abscesses, encephalopathy, or spinal meningitis.² TBM is the most common form, accounting for 20–45% of all tuberculosis cases in children, but only 2.9–5.9% of adult tuberculosis cases.²

Though early diagnosis and treatment of this form of tuberculosis is crucial, it remains a challenging entity for clinicians due to the difficulties involved in diagnosis and its high morbidity and mortality.

Case Report

A 14-month-old boy was brought into the emergency department suffering from a progressive right-sided

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hemiparesis and repeated generalized tonic-clonic seizures, which started 12 hours prior to presentation. Before the appearance of symptoms, he was generally well and could stand and walk without help. He was also able to say several words. On examination, he was irritable, with a right-sided hemiparesis associated with hyperreflexia. There was no fever, rash, or organ involvement. Brain computed tomography (CT) was unremarkable, but magnetic resonance imaging revealed a small area of low signal intensity in the left internal capsule (Figures 1A and 1B). Magnetic resonance angiography was normal. Extensive investigations for evidence of a stroke, including lumbar puncture and laboratory tests for vasculitis and coagulation disorders, were inconclusive except for the finding of a cerebrospinal fluid (CSF) protein level of 150 mg/dL. He was discharged 1 week later with phenobarbital and physiotherapy, and over the next 2 months, his motor deficit improved. However, he experienced a sudden, severe worsening of his hemiparesis and a gradual deterioration in consciousness. On admission to the hospital, he was drowsy, with bilateral sixth nerve palsies, bilateral papilloedema, right-sided hemiplegia and severe spasticity of all four limbs. He deteriorated rapidly to decerebrate rigidity and bilateral midsized reactive pupils. Brain CT showed severe tri-ventricular hydrocephalus, periventricular edema and enlargement of the porencephalic cyst at the site of the previous infarct (Figure 2). Emergency ventriculoperitoneal shunting was performed. CSF obtained from the ventricles was normal. His consciousness level improved dramatically several hours after shunting. At the time of discharge, he could move his right side maximally against

gravity (power grade 3/5). A second brain CT scan showed a marked decrease in ventricular size. He remained well during his next outpatient visits over the following 4 months, but then complained of severe abdominal pain and distention. Abdominal ultrasound revealed ascites and a pseudocyst. A low grade fever was detected for the first time since first presentation. Analysis of the peritoneal fluid showed a high protein content (1,500 mg/dL), high white blood cell count (1,400/dL: 60% lymphocytes and 40% polymorphonuclear cells), and a low glucose (30 mg/dL) level, but negative cultures. Following the diagnosis of distal shunt infection, the peritoneal catheter was externalized and ceftazidime, vancomycin, and oral rifampin were started immediately. Ventricular CSF analysis

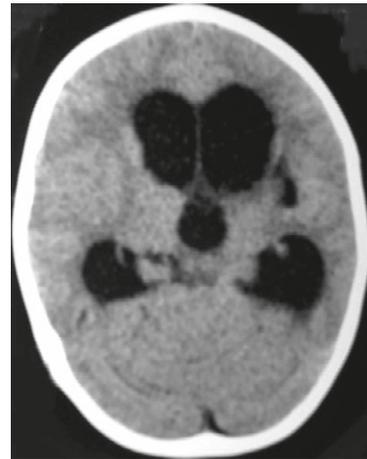


Figure 2. Brain computed tomography revealed severe hydrocephalus and a prominent hypodense area in the left internal capsule on second admission.

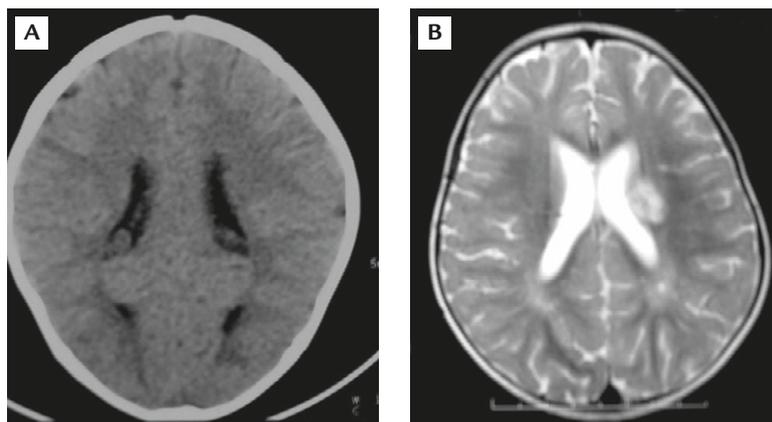


Figure 1. (A) Brain computed tomography scan on first admission was unremarkable. (B) Axial view of T2 weighted magnetic resonance imaging taken on first admission demonstrates the hypersignal area in left internal capsule. There is no hydrocephalus.

was normal. After 3 weeks of antibiotic therapy, a new ventricular-peritoneal shunt was inserted at the contralateral side. During the procedure, the peritoneum looked very thick. Peritoneal biopsy showed granuloma formation with caseous necrosis. Cultures for the usual bacteria, fungi, and tubercle bacilli were all negative. The PPD (purified protein derivative) skin test and culture of the gastric washings for tuberculosis were also negative, but polymerase chain reaction of the CSF was positive for *Mycobacterium tuberculosis*. Tests for human immunodeficiency virus were also negative. The patient's first-degree relatives were assessed by tuberculin skin test and chest radiography, which were all negative. However, his grandfather, who had a productive cough, declined further investigations. Antituberculous therapy was started immediately with a four-drug regimen for the first 2 months, continued with a two-drug regimen, for a total course of 1 year. The patient had one attack of drug-induced hepatitis 2 weeks after starting antituberculous therapy that was managed conservatively. Subsequent to this episode he tolerated the management very well without any drug or shunt complications. Now, 2 years post treatment, he is stable, with persistent mild hemiparesis, but he can walk with a brace and speak normally.

Discussion

TBM is the most severe life-threatening form of tuberculosis in children. The diagnosis of TBM is very difficult because of its insidious onset, particularly in the initial stages, and many patients, especially children, reach hospital in a critical condition.

CNS infection with *M. tuberculosis* causes a granulomatous, inflammatory reaction that involves the meninges, cisterns and parenchyma.²

The onset of TBM is usually gradual, but can occasionally be abrupt and manifested by a seizure. The disease course is usually divided into three stages. At the outset, it is characterized by personality changes, irritability, anorexia, listlessness, and apathy 1–2 weeks later. The disease then moves into its second stage when signs of increased intracranial pressure in the form of drowsiness, stiff neck, cranial nerve palsies, inequality of pupils, vomiting and convulsions appear. Ultimately, the disease culminates in the third stage, which is characterized by coma,

irregular pulse and respiration, decorticate and decerebrate posturing, and death.^{1,2}

Because of the lack of reliable diagnostic criteria, as well as the length of time needed for bacteriologic confirmation and nonspecific imaging findings, diagnosis and treatment are often delayed. This delay can have a disastrous effect upon prognosis. The fact that CSF analysis may show a predominance of polymorphonuclear cells, but normal glucose or protein levels, can further contribute to diagnostic delay.³

Moreover, the reported probability of acid-fast bacilli observed in CSF smears and positive cultures is 10–87% and 47–87% respectively. The reported sensitivity of polymerase chain reaction varies from 33 to 90%.⁴ TBM may also initially present as one of its complications, which adds to the complexity of the diagnosis. Therefore, a high degree of suspicion is required in this young age group.

The incidence of cerebral infarction secondary to TBM is reportedly 6–47%. The mechanism is not well understood but vasculitis, infringement by inflammatory exudates and vasospasm have all been suggested.⁵ The majority of infarcts occur in the so called “tuberculosis zone” supplied by the medial striate and thalamoperforating arteries.⁶ The site of the stroke found in this case was typical for tuberculosis, but the lack of pertinent clinical and laboratory manifestations of TBM precluded an accurate diagnosis at that stage.

The evolution of hydrocephalus in TBM is due to the blockade of CSF pathways and/or impaired CSF absorption. It can occur either early or late in the clinical course,⁷ and is the most common abnormality seen on cranial CT in TBM.⁴ Hydrocephalus upon presentation is associated with a longer duration of presenting symptoms and may be a feature of delayed presentation.⁷ This pattern of presentation may help in making an early diagnosis, especially when accompanied by infarction. Shunt infection and obstruction in patients with TBM who undergo ventriculoperitoneal shunting are also common complications.⁸ To the best of our knowledge, gross peritoneal involvement following shunt placement has not been reported in the literature. This is a very unusual sequence of presentation for TBM, in which infarction and vasculopathy appeared first, followed by hydrocephalus without any evidence of significant CSF changes. Finally, observation of peritoneal involvement following ventriculoperitoneal

shunt led to the correct diagnosis. This case history highlights the fact that reliance on bacteriologic evaluations in suspected cases of TBM can significantly delay diagnosis. Antituberculous drugs should be started immediately if there is any suspicion of TBM, pending the final biochemical results and confirmation.

In conclusion, tuberculosis involving the CNS is a complex and potentially devastating disease. Since early diagnosis and initiation of treatment are extremely important in preventing morbidity and mortality, the possibility of TBM should be kept in mind in every moribund pediatric patient in developing countries, or those coming from a developing country, whose diagnosis is unknown.

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