NEUROCYSTICEROSIS IN CEARÁ STATE, NORTHEASTERN BRAZIL: A REVIEW OF 119 CASES


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Abstract. Relatively little is known about the occurrence of neurocysticercosis in northeastern Brazil. There have been no published reports from the state of Ceará, but a review of the records at the Hospital São José in Fortaleza, Brazil identified 119 patients with neurocysticercosis diagnosed between January 1988 and April 1994. Patients came from 43 municipalities in Ceará. Their ages ranged from five to 74 years; the greatest number of cases were in persons 10–40 years of age; 63% were males. Seizures were the presenting complaint in 64% of the patients and headache in 22%. Two patients, each with several hundred intracranial lesions, presented with mental status changes; one was initially given the clinical diagnosis of viral meningoencephalitis. Computed tomography scans showed that 44% of the patients had five or more lesions. Cysts were found throughout the brain. The parietal lobe was the most frequent site of involvement; 85% of patients had one or more lesions there. The brain stem was involved in 8%. There was no consistent association between the severity of the clinical abnormalities and the radiologic findings. Computed tomography of the thighs was done in 10 persons; cysts were identified in nine.

Cysticercosis is an important health problem throughout Latin America from Mexico to Peru, but relatively little is known about its impact in northeastern Brazil. The disease is found in developing areas where pigs are raised and sanitation is poor. Transmission occurs when humans ingest ova in food or water that has been contaminated with feces from humans who harbor adult Taenia solium. Ova excyst in the intestine releasing larvae that invade and form tissue cysts (cysticerci) in brain, muscle, eye, or other tissues.

Involvement of the central nervous system results in neurocysticercosis, an important cause of seizures and other neurologic abnormalities among residents of endemic areas. Neurocysticercosis is encountered in the United States among immigrants from endemic areas. Cases of cysticercosis have also been reported among residents of North America who have never visited endemic areas, but who have been exposed to immigrants infected with adult T. solium. As this series illustrates, neurocysticercosis is an important cause of morbidity in northeastern Brazil.

METHODS

The records of the Hospital São José, located in Fortaleza in the state of Ceará were reviewed for the period January 1988 through April 1994 to identify cases of neurocysticercosis. Patients were included in the study if they had neurologic symptoms or signs and a head computed tomography (CT) scan that documented single or multiple cystic lesions in the brain, with or without contrast enhancement; if there were enhancing nodular lesions; if there were small calcified lesions; or if there was a combination of the these findings (Figure 1). In 13 (11%) cases the diagnosis was confirmed by biopsy. Serological studies were not routinely performed. The age and sex of the patients, their home municipalities, their presenting symptoms, and the results of their radiologic studies were recorded.

This study was reviewed and approved by the Human Investigation Committee at the University of Virginia Health Sciences Center. The Human Investigation Committee at the Universidade Federal do Ceará does not require approval for chart reviews in which patients are not identified.

RESULTS

A total of 135 patients were admitted to the Hospital São José with a diagnosis of possible neurocysticercosis during the period of study; 119 met the diagnostic criteria. The patients were from 43 municipalities; 52% lived in the capital city of Fortaleza. Males accounted for 63% of the cases. The age distribution was as follows: 6% of patients were less than 10 years of age, 20% were between 11 and 20 years of age, 32% were between 21 and 30 years of age, 12% were between 31 and 40 years of age, 10% were between 41 and 50 years of age, 10% were between 51 and 60 years of age, and 10% were greater than 61 years of age.

Seizures were the presenting complaint in 64%, headache in 22%, other neurologic symptoms in 8%, and subcutaneous nodules in 6%. Two patients had global mental status changes, one of whom was initially thought to have viral meningoencephalitis. Both of them had several hundred cysts detected by magnetic resonance imaging (MRI) (Figure 2). The time from the onset of symptoms to diagnosis was variable: in 8% of the patients it was one week or less, in 13% it was between one and 4 weeks, in 28% it was between one and 12 months, and in 50% it was greater than one year. During the course of disease, generalized seizures occurred in 71% of the patients, focal seizures in 10%, headaches in 71%, visual abnormalities in 31%, and papilledema in 8%. Twenty-seven patients were treated with praziquantel and 92 were treated with albendazole.

Head CT scans from 79 patients and MRIs from two were available for review (Figures 1 and 2). A single lesion was observed in 30%, 2–5 lesions were present in 26% and five or more lesions were present in 44% of the patients. Lesions were located throughout the brain; 85% of patients had one or more in the parietal lobes, 60% had one or more in the frontal lobes, 50% had one or more in the occipital lobes, 47% had one or more in the temporal lobes, 19% had one or more in the cerebellum, and 8% had one or more brain stem lesions. Computed tomography examination of the thighs was done in 10 patients, and cysts were identified in nine (Figure 3).
FIGURE 1. Cerebral computed tomography (CT) scans of a 66-year-old woman who presented with a five-month history of generalized seizures, which were only partially controlled with phenobarbital. A, CT without contrast demonstrating typical cysticerci, some with calcifications. B, CT with contrast showing enhancement around dying cysticerci.

FIGURE 2. Cerebral magnetic resonance imaging of a 13-year-old girl who was admitted comatose with a four-month history of headache, visual hallucinations, and intermittent focal seizures. The scan shows hundreds of cysticerci.
As these data illustrate, neurocysticercosis poses an important health problem in northeastern Brazil in the state of Ceará. The patients included in this series probably represent only a small percentage of those with neurocysticercosis in the state. Many persons in Ceará do not have easy access to medical care, and of those who do, only a limited number are referred to the Hospital São José for imaging studies. Although serologic surveys have not yet been performed, the finding that patients came from a large number of municipalities suggests that the disease is probably widespread.

Consistent with experience elsewhere, the most frequent presenting complaint of persons hospitalized with neurocysticercosis was seizures; the majority were grand mal, but some were focal. The remainder of patients came for evaluation of headaches, other neurologic abnormalities, visual disturbances, or subcutaneous nodules. Persons of all ages were infected; the disease was most commonly diagnosed in persons 10–40 years of age. Although the diagnosis was made within one month of the onset of symptoms in 21% of the patients, the majority had had symptoms for more than a year.

The radiographic findings in this group were often dramatic. More than 40% of the patients had five or more identifiable brain cysts, and two patients had hundreds. The lesions were located throughout the brain, and some patients had them in the brain stem. There was no apparent association between the clinical findings and the number and location of cysts, although the two patients with hundreds of cysts presented with global mental status changes. In addition to the brain, CT evaluation of the thighs demonstrated cysticerci in 90% of those who were imaged.

The life cycle of *T. solium* is straightforward. Cysticerci are found in the muscles of pigs. When humans ingest inadequately cooked, infested pork, each cysticercus releases a scolex that can anchor in the intestinal mucosa and develop into an adult tapeworm. Proglottids and ova are excreted in feces and subsequently complete the life cycle when ingested by pigs. Humans develop cysticercosis when they ingest ova in food or water that has been contaminated with human feces. Deficient personal hygiene can result in autoinfection in those who harbor adult tapeworms.

Transmission of cysticercosis can be interrupted at several points in the life cycle. Acquisition of adult tapeworms can be prevented by thoroughly cooking pork. Public educational is needed to emphasis this point to residents of Ceará. Efforts are underway to build sewers and to improve sanitation. The sanitary disposal of human feces is obviously very important, but experience in the United States where cysticercosis has been acquired from immigrant household workers suggests that hygienic practices must be followed in food preparation. The treatment of persons who harbor adult tapeworms can protect the host and others from ingestion of ova.

Finally, neurocysticercosis must be considered in the dif-
ferential diagnosis of persons with seizures or other neurologic abnormalities who live in Ceará or who have immigrated from it. Both albendazole and praziquantel can kill parenchymal cysts. Their use is discussed elsewhere. Although the treatment of neurocysticercosis can influence the course of the disease, it does not affect transmission.

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