Original Research

Neurocysticercosis in infants

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Abstract
Background:Neurocysticercosis (NCC) is an acquired infection of the nervous system caused by encysted larvae of Taenia solium. This study was conducted to assess clinical manifestations of Neurocysticercosis in infants
Material and methods: This study comprised of 20 infants. Before starting the procedure, the consent was taken from the parents of infants. The infants were clinically examined and the results were noted. Statistical analysis was conducted using SPSS software.
Results: In this study of 20 infants, 10 subjects were males and 10 were females. Seizures were seen in 4 infants; intracranial hypertension was seen in 3 infants and vomiting was seen in 1 infant.
Conclusion: The most common clinical manifestation of neurocysticercosis was seizure.
Keywords: neurocysticercosis, infants

Introduction

Neurocysticercosis (NCC) is an acquired infection of the nervous system caused by encysted larvae of Taenia solium. It is the most common helminth infection of the nervous system in humans, a major cause of epilepsy in the tropics, and the commonest cause of focal seizures in North Indian children.[1,2] T. solium teniasis-cysticercosis has been identified as parasitic "Neglected Tropical Diseases" endemic throughout Southeast Asia by World Health Organization.[3]Although predominantly a disease of the developing countries, it is also seen in many developed countries due to the immigrant population from endemic areas and increasing international travel. NCC in children has pleomorphic manifestations depending on the location, number and viability of the cysts, and host response. Management of NCC has been debated around several issues: 1) effectiveness of the anti-parasitic drugs in killing the cysts and in improving the clinical outcome (defined as fewer seizures, in patients with intraparenchymal NCC), 2) choice of the optimal cysticidal drug, 3) use of steroids, and 4) optimal duration of AED therapy. Understandably, the benefits of antiparasitic regimens are more evident in patients with multiple viable cysts and less evident in patients with degenerating lesions.With advancing knowledge of the disease manifestations, many aspects related to the diagnosis and treatment in children still remain poorly understood and pose challenges to clinical practice.[4]This study was conducted to assess Neurocysticercosis in infants

Material and methods

The present study was conducted to assess Neurocysticercosis in infants. A total of 20 infants were evaluated. Detailed history was then collected from each patient and/or guardian/parents. Each infant was clinically examined and 2mL blood samples were collected. The age range of patients was upto4 years. CT imaging was performed in all cases. The study subjects were hypothesized as possible cases of NCC based on two minor plus one epidemiological criteria as per the revised diagnostic criteria. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

Results

In this study of 20 infants, 10 subjects were males and 10 were females. Mean age of the infants was 2.1 years. Seizures were seen in 4 infants, intracranial hypertension was seen in 3 infants and vomiting was seen in 1 infant. Neurologic examination was normal in all but three patients who had transient hemiparesis after a seizureepisode. Serum immunoblot for the detection of anticysticercal antibodies was positive in twelve patients. Neuroimaging studies showed parenchymal brain cysticercosis in all cases.

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	10	50%
Females	10	50%
Total	20	100%

Table 2: Clinical manifestations of Neurocysticercosis

Clinical manifestations	Number of subjects
Seizures	04
Intracranial hypertension	03
Vomiting	01

Discussion

Neurocysticercosis (NCC) is defined as the infection of the central nervous system (CNS) and the meninges by the larval stage of Taenia solium, the pork tapeworm. NCC is currently widespread and represents the most common helminthic infection of the central nervous system (CNS). While the prevalence of NCC is not known, it is probable that millions of people are infected by this parasite, and that many of them will experience clinical manifestations of this disease at any point of their lives. NCC is endemic in most Latin American countries, the sub-Saharan Africa, and some regions of Asia. On the contrary, NCC is not common in Northern Europe, the US, Canada, Australia, Japan and New Zealand—except among immigrants—and is eventually reported from Israel and Muslim countries.Worldwide, one third of the total epilepsy cases arise in childhood and neurocysticercosis (NCC) is the major cause particularly in developing countries including India and Latin America.[4-6] NCC is caused by the metacestode larval stage of *Taenia solium*, and it affects patients of all ages.[7]In India, NCC is the most common cause of convulsions and hydrocephalus in adults and is the single most common cause of community acquired active epilepsy.[8,9] NCC patients may remain asymptomatic for months to years, and commonly a diagnosis is made incidentally when neuro-imaging is performed. However, its manifestations are variable and somewhat different when it occurs in children.[10]NCC in children is believed to be infrequent, but, as methods of diagnosis (imaging techniques and immunological tests) have improved, it has become possible to confirm more cases.[10]This study was conducted to assess clinical manifestations of Neurocysticercosis in infants. In this study of 20 infants, 10 subjects were males and 10 were females. Mean age of the infants was 2.1 years. Seizures were seen in 4 infants, intracranial hypertension was seen in 3 infants and vomiting was seen in 1 infant. Neurologic examination was normal in all but three patients who had transient hemiparesis after a seizureepisode. Serum immunoblot for the detection of anticysticercal antibodies was positive in twelve patients. Neuroimaging studies showed parenchymal brain cysticercosis in all cases. Del Brutto OH[11]evaluated all patients aged ≤3 years with neurocysticercosis. Their household contacts were screened to detect Taenia solium carriers, which may represent the source of infection. A literature search on neurocysticercosis in infants and toddlers was also performed to compare personal cases with those described elsewhere. A total of 25 infants and toddlers with neurocysticercosis were included (seven from their institution and 18 from the literature). All patients had seizures as the primary manifestation of the disease, and neuroimaging studies showed one or two parenchymal brain cysticerci in the colloidal stage in 88% of patients. The source of infection was investigated in 11 houses, including the seven households of the present series, and only four of the 18 reported in the literature. A Taenia carrier was found in five (45%) of these households, including three from the present series and two from the literature. A sizable proportion of infants and toddlers with neurocysticercosis have been infected at home. Compulsory search of Taenia carriers among household contacts will allow the detection of the potential source of infection and will reduce further spread of the disease. Bhattacharjee S et al[12] evaluated the clinical profiles, diagnosis, treatment and follow-up results of 51 pediatric neurocysticercosis patients over a mean duration of five years. Diagnosis was mainly based on clinical features, computed tomography (CT)/magnetic resonance imaging scan and exclusion of other causes. Patients with active, transitional cysts and seizure were treated with albendazole for 28 days, steroids and anticonvulsants. A total of 38 patients completed this study. Mean age of the presentation was 8.47 ± 3.19 years 52.6% of the patients were female. Overall patients presented with generalized seizure in 55.3%, focal in 31.6%, headache ± vomiting in 63.2%, focal neurodeficit in 10.5% and combination of symptoms in 60.5% cases. Contrast CT brain showed a solitary lesion in 27 (71.1%) and multiple in the rest. At presentation lesions were transitional in 58.2%, inactive in 20% and mixed in 14.6%. After a mean of 2 years, seizure persisted in 9 (23.7%) and headache in 8 (21.1%) of whom six had normal electroencephalography (EEG) while one each showed focal slowing, generalized slowing and epileptiform discharges. During the follow-up, CT scan brain 44.7% lesions calcified, 31.6% disappeared, 10.5% regressed and the rest persisted. Solitary ring enhancing lesions (transitional

stage) involving the parietal lobe was the commonest CT picture at presentation. Generalized tonic-clonic seizure was the most common type of seizure. Number of lesions, persistence of lesion, number of seizures, EEG abnormality at presentation were not found to be prognostically significant ($P > 0.05$). In another study conducted by Sahu et al, authors screened neurological pediatric cases presenting with afebrile seizures for anti-Cysticercus antibodies (IgG) in their sera in order to estimate the possible burden of cysticercal etiology. The study included a total of 61 pediatric afebrile seizure subjects (aged one to 15 years old); there was a male predominance. All the sera were tested using a pre-evaluated commercially procured IgG-ELISA kit (UB-Magiwell Cysticercosis Kit ™). Anti-Cysticercus antibody in serum was positive in 23 of 61 (37.7%) cases. The majority of cases with a positive ELISA test presented with generalized seizure (52.17%), followed by complex partial seizure (26.08%), and simple partial seizure (21.73%). Headaches were the major complaint (73.91%). Other presentations were vomiting (47.82%), pallor (34.78%), altered sensorium (26.08%), and muscle weakness (13.04%). There was one hemiparesis case diagnosed to be NCC. In this study one child without any significant findings on imaging was also found to be positive by serology. There was a statistically significant association found between the cases with multiple lesions on the brain and the ELISA-positivity ($p = 0.017$). Overall positivity of the ELISA showed a potential cysticercal etiology. Hence, neurocysticercosis should be suspected in every child presenting with afebrile seizure especially with a radio-imaging supportive diagnosis in tropical developing countries or areas endemic for taeniasis/cysticercosis.[13]

Conclusion

The most common clinical manifestation of neurocysticercosis was seizure.

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