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Study of Clinical and Radiological Profile of Neurocysticercosis in Children in Eastern Bihar

KEYWORDS: Cysticercosis, Neurocysticercosis, NCC, Childhood seizure, CECT

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ABSTRACT

Background: *Neurocysticercosis (NCC) is the most common helminthic central nervous system (CNS) infection in developing countries, and is the most common cause of symptomatic epilepsy worldwide.*

Aims and objectives: *The main objective is to study the clinical profiles as well as radiological findings including number, stage, size and location of the lesion by using CECT of brain.*

Methods: *In the present study total 52 patients were selected for study within a period from April 2015 to March 2016 coming under definitive or probable diagnosis of neurocysticercosis as per the revised diagnostic criteria for neurocysticercosis. Contrast enhanced CT scan (CECT) of the head was done in all the children included in the study.*

Results: *Almost all the patients included in the study presented with seizures. Among seizures type, 35(67.3%) children presented with partial seizures, whereas 17(32.6%) children presented with generalized seizures. On CECT brain single lesion was present in 47 (90.3%) patients. Parietal lobe was the most common 34 (65.3%) site involved in our study. Colloidal stage, observed among 33 (63.4%) was the most common stage of NCC. As far as size in concerned, 27 (51.9%) of the patients, the size of lesion in CECT brain was 5-10 mm, in 18 (34.6%) it was <5 mm. However, the Size of lesion in CECT Brain was >10 mm in only 7 (13.6%).*

Conclusions: *Most of the children with NCC presented with variety of clinical features including seizures, headache and vomiting. Among them seizure was the most common presentation. Among all types of seizures, partial seizures were more common than generalised seizure. On CECT brain solitary lesions were more common than multiple lesions while Colloidal stage was the most common. Most of lesion involved parietal lobe.*

INTRODUCTION

Neurocysticercosis (NCC) is the most common helminthic central nervous system (CNS) infection in developing countries. It is considered by the WHO to be the most common preventable cause of epilepsy particularly in developing countries including India. It is found to be the commonest cause of focal seizures in North Indian children. Human can acquire 2 different forms of infection—by eating raw or undercooked pork containing T solium cysts or by eating food contaminated with T solium eggs. Cysts consumed in undercooked meat mature into adult parasites in the human intestine, at which time they release eggs and gravid proglottids in the stool. This form of intestinal infection is called taeniasis. When T. solium eggs are consumed, through fecal–oral transmission from another human with taeniasis or through autoinfection, they release oncospheres into the host's digestive tract and can then migrate throughout the host's body, becoming encysted in end organs. This systemic infection is called cysticercosis. Seeding of larvae in the CNS results in neurocysticercosis. Neurocysticercosis, in turn, may affect the CNS parenchyma or the CSF space. Cycsticerci often live asymptomatically within host tissues for years as they have developed various mechanisms for evading host response. Metacestodes secrete a serine protease inhibitor- taeniaestatin which inhibits complement activation and cytokine production and interferes with leukocyte chemotaxis. Parasite paramyosin also binds to C1q and inhibits the classic pathway of complement activation. The cellular immune response is also suppressed. Cysticercal cysts evolve through 4 stages, with different appearances on neuroimaging—the "vesicular stage", where the cyst contains a living larva; a "colloidal stage" as the larva degenerates; a "granulonodular" stage as the membrane of the cyst thickens; and the final stage of "calcification". Only cysts in the vesicular and colloidal stages contain live larvae and are amenable to anticysticercal treatment. Encysted larvae can remain asymptomatic for years. When the larvae do elicit a host immune response, patients can develop brain edema and, more often, seizures.

NCC is associated with a wide variety of clinical manifestations. These are determined by several important factors including the burden of organisms, the location of encystment, the stage of cystercerci and the host response to the infection. The disease is recognized mainly in children older than 7 years, owing to this incubation period.. Seizures are the commonest presentation of NCC. Four Various types of seizures have been described among patients with NCC including generalized, focal and rarely myoclonus and acquired epileptic aphasia. In general, it seems that about half the cases have partial seizures and the other half generalized seizures, a proportion similar to that of the general population. Usually, there is no evidence of persistent focal neurological deficit and raised intracranial pressure

Neuroimaging is the mainstay of diagnosis of NCC. After the availability of CT scans in India, patients with epilepsy were frequently found to have a lesion, which was termed as SSECTL. (single small enhancing computerized tomographic lesion). They are the commonest cause of partial seizures in children in India. After a long period of controversy, it is now believed that most of these lesions represent solitary cerebral cysticercus granuloma (SCCG). SCCG is the granular-nodular form of the parenchymal cyst. It accounts for nearly 60- 70% of all forms of NCC seen among Indian patients. The differential diagnosis could be tuberculoma, pyogenic brain abscesses, fungal abscess, toxoplasmosis, primary or metastatic brain tumor and infections vasculitis.

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As Clinical manifestations and Radiological finding of NCC is variable in children. So our present study has been conducted to study the clinical profiles as well as radiological findings including number, stage, size and location of the lesion by using CECT of brain.

METHODS

The present study is an observational study, which was conducted in the Paediatrics department, of J.L.N. Medical college & Hospital Bhagalpur, a tertiary care teaching hospital in Eastern Bihar, within a period from April 2015 to April 2016. The institutional ethical committee approved the study.

Inclusion criteria: Child of age between 1 year to 12 years, coming under definitive or probable diagnosis of neurocysticercosis as per the revised diagnostic criteria for neurocysticercosis. Thus, the diagnosis will be based on clinical and CECT scan, MRI not done due to non-affordability of the patients.

Exclusion criteria : Cases with evidence of tuberculosis including mantoux positivity, HIV-reactive patients, Cases with known malignancy, patients in moribund condition and whose guardian have not given consent were excluded from study.

All the patients under study were examined thoroughly including detailed medical history and clinical examination with emphasis on the description of the seizure including type and duration of seizures , headache, vomiting, loss of consciousness, loss of vision, behavioural change, fever, subcutaneous nodule, rashes, worm in stool, pain in abdomen, anthropometric measurements, General examination, and systemic examination, including neurological examination was performed. Diagnostic evaluation of all the patient was done which included , complete hemogram, peripheral blood smear, microscopic examination of stool done for taeniasis, work-up for tuberculosis (erythrocyte sedimentation rate, Mantoux test, chest x ray), ELISA for HIV, EEG, CECT scan of head. Stool- for evidence of *Taenia solium* infestation. Contrast enhanced CT scan of the head was performed in radiology department of JLNMCH Bhagalpur. . At the time of the initial CT scan, emphasis was given on the following characteristics of the lesions: no. of lesion, location, size, stage, presence of Scolex, associated perilesional edema.

Statistical Analysis. Statistical analyses were performed by using SPSS version 16 software.

RESULTS

In this study total 52 children were diagnosed as neurocysticercosis as per diagnostic criteria.

Demographic and clinical features

Most common age group was between 9-12 years (51.9%) mean age was 9.3±2.5. Male (63.4%) were affected more than the female (36.5%). Seizure was the most common presentation (84.6%), followed by features of raised intracranial pressure including headache and vomiting (32.6%), focal neurological deficits (3.8%) and features of encephalitis (1.9%),. Demographic and Clinical profiles of the patients are summarized in Table 1.

Table 1: Demographic and Clinical profiles of the patients

Demographic and clinical Parameters	Numbers (%)
Age	
1-4 years	3(5.7)
5-8 years	22 (42.3)
9-12 years	27 (51.9)
Sex	
MALE	33(63.4)
FEMALE	19 (36.5)
Clinical presentation	
Seizures	44(84.6)
Features of raised intracranial pressure	17(32.6)
Focal Neurodeficits	2(3.8)
Features of Encephalitis:	1(1.9)
Type of seizure	
Partial seizures	35 (67.3)
Generalised seizures	17(32.6)

CECT finding at enrolment

In the present study most of the lesions were solitary (90.3%), there were five subjects with multiple (more than 1 lesion) and five had calcified lesion. Colloidal stage was observed among 63.4%, nodular stage was seen in 13.4% patients. Vesicular stage was found in 13.4% of the, hence, colloidal stage came out to be the most common presentation on CECT (brain). The mean size (Mean±SD) of lesion in our study was 6.58±3.34 mm. 34.6% children had lesion size <5 mm on CECT and the size between 5- 10 mm was observed in 51.9% while 13.6% have size >10 mm, summarized in Table 2.

Table 2: CECT finding of the patient

Features	Number (percentage %)
Site	
Frontal lobe	9 (17.3%)
Parietal lobe	34 (65.3%)
Occipital lobe	9 (17.3%)
Numbers	
Single lesion	47 (90.3%)
Multiple lesion	05 (9.6%)
Stage	
Vesicular	07 (13.4%)
Colloidal	33 (63.4%)
Nodular	07 (13.4%)
Calcified	05 (9.6%)
Size	
<5 mm	18 (34.6%)
5-10 mm	27 (51.9%)
>10 mm	07 (13.6%)

DISCUSSION

Most common age group was between 9-12 years (51.9%) in the present study and mean age was 8.7±2.8 years. Male (63.5%) were affected more than the female (36.5%). Most common presentation was seizure (84.6%). Most children presented with partial seizures particularly complex partial seizures; about 20% patients had simple partial seizures. In most of the cases seizures were of short duration, generally lasting for less than 5 minutes. 6 children (11.5%) presented with Status epilepticus. Contrast enhanced CT (CECT) is a useful modality; it is helpful in recognizing the ring enhancing lesion as well as identifying the stage of lesion in NCC. In the present study most of the lesions (90.3%) were solitary, there were five children(9.6%) with multiple (more than 1 lesion). In our study, colloidal stage was observed among 63.4%, nodular stage was seen in 13.4% patients. Vesicular stage was found in 13.4 % of the, hence, colloidal stage was the the most common presentation on CECT. The mean size (Mean±SD) of lesion in our study was 6.58±3.34 mm. 34.6% children had lesion size <5 mm on CECT and the size between 5-10 mm was observed in 51.9% while 13.6% have size >10 mm. There was no statistical difference

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(p>0.05) in terms of size but clinically majority of the study group had smaller size <10 mm.

CONCLUSION

NCC is associated with a wide variety of clinical manifestations. In the present study also majority of patients with NCC presented with clusters of symptoms including seizure, headache and vomiting. Among them seizure was the most common presentation. Among all types of seizures, partial seizures were more common than generalised seizure. Since pathologic

confirmation of the parasite is hardly ever feasible, diagnosis rests mainly on neuroimaging. So neuroimaging is the mainstay of diagnosis of NCC. CECT brain evolved as the most useful modality of screening of patients with NCC in recognizing the ring enhancing lesion and identifying the stage. On CECT brain solitary lesions were more common than multiple lesions. Among the four stages of NCC Colloidal stage was the most common in children on CECT Brain. Most of lesion involved parietal lobe with frontal and occipital showing equal presentation.

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