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Original Research Paper

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CLINICO-RADIOLOGICAL PROFILE OF NEUROCYSTICERCOSIS AMONG CHILDREN WITH FIRST ONSET SEIZURE IN RURAL MEDICAL COLLEGE OF NORTH INDIA.

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ABSTRACT

BACKGROUND: Neurocysticercosis is a major public health problem in tropical developing countries where it affects patients of all ages. The aim of present study was to study the clinico-radiological profile of patients with first onset seizure diagnosed with neurocysticercosis. **MATERIALS AND METHODS:** This was a hospital based prospective cross-sectional study carried out at rural medical college in northwest India. All consecutive patients diagnosed with neurocysticercosis, aged ≥ 1 year to 15 years (43 patients), admitted in pediatric emergency with first onset seizure for the period of 6 months were selected for study. **RESULTS:** 90.7% were afebrile, 46.5% presented with headache, 55.8% had vomiting and 86% had H/O loss of consciousness. 72.1% had generalized onset seizure followed by 25.6% with focal onset seizure and 2.3% with seizure of unknown onset. Duration of seizure was > 15 minutes in 60.5% of patients followed by 5-15 minutes in 23.3% patients and < 5 minutes in 16.3% patients.74.4% had single lesion and 25.6% had multiple lesions. Most common lobar involvement was of parietal lobe (44.2%) followed by > 1 lobe involvement (20.9%), frontal lobe (18.6%), occipital lobe (9.3%) and temporal lobe (7%).The most common stage of NCC with lobe involvement was colloidal type followed by vesicular type and granular type. **CONCLUSION:** NCC is common in first onset unprovoked seizure, so patients with unprovoked seizure should be investigated with neuroimaging. MRI is preferred as it better delineates the pathology.

KEYWORDS : Neurocysticercosis, clinico-radiological profile, first onset seizure.

INTRODUCTION

Neurocysticercosis is a significant public health problem in developing countries where all age patient were affected. [1] It is caused by infection with metacestode larva of Taenia solium and central nervous system is known to be the most common.

Epidemiological evidence also suggests that the most common source of infective eggs is a symptom-free tapeworm carrier in the household.[2]

In human brain parenchyma, the larval form of Taenia solium undergoes four stages of evolution namely vesicular, colloidal, granular-nodular and nodular calcification. The term, cysticercous granuloma is used for parasites in the colloidal or the granular-nodular stages .These two stages are together considered as transitional or degenerative phase of the disease process.

The clinical manifestations of NCC are non-specific and varied, depending on the number of lesions as well as the developmental stage of the parasite. Seizures are the commonest manifestation, occurring in 50%–80% of patients.[3,4] NCC is considered to be the single most common cause of epilepsy in the developing countries which are known to be endemic for T. solium taeniasis/ cysticercosis.[5,6] A meta-analysis summarizes the proportion of NCC among patients with epilepsy (PWE), and suggests that in endemic communities nearly one-third of PWE are living with T. solium cystic lesions in their brain.[7]

In the clinical setting, the diagnosis of NCC is not simple because similar clinical and radiological picture can also be present in other diseases of the central nervous system (CNS). In fact the only way of obtaining a definitive diagnosis is through surgical removal and subsequent identification of the parasite. However this invasive method is seldom practiced, as most of these lesions carry a benign and self-limiting course. Therefore, a diagnosis of NCC is usually obtained after combining the clinical findings with radiological, serological, and epidemiological data, which was the basis of the consensus for the accurate and stringent revised criteria for the diagnosis of NCC (Del Brutto et al, 2001). [8]The aim of present study was to study the clinico-radiological profile of patients with first onset seizure diagnosed with neurocysticercosis.

MATERIALS AND METHODS:

This was a hospital based prospective cross-sectional study carried out at medical college in northwest India. This medical college is located in rural area that caters mainly rural population. All consecutive patients diagnosed with Neurocysticercosis, aged ≥ 1 year to 15 years, admitted in pediatric emergency with first onset seizure comprised our study population. The study was conducted over a period of 6 months from October 2018 to March 2019. All the patients admitted with first onset seizure were investigated for the probable cause of seizure. The patients were diagnosed with help of routine investigation, serum electrolytes, serum calcium, CSF analysis, CBNAAT and MRI brain. A high resolution Philips 1.5 tesla advance MRI Machine was used. Seizures were classified according to ILAE classification 2017 into generalized onset seizure, focal onset seizure and unknown onset seizure. The patients were diagnosed on the basis of MRI findings where lesions showed scolex (Absolute criteria). The diagnosis of NCC (definitive or probable NCC based on the absolute, major, minor and epidemiologic criteria) was made according to the published criteria by Del Bruto et al, 2001.[8]Here in present study cystic lesion showing scolex on MRI was taken as diagnostic criteria.

INCLUSION CRITERIA:

1. Children admitted to pediatric ward with first onset seizure
2. Age group of 1 year to 15 years.

Exclusion criteria:

1. Known neurological disability
2. Any previous episode of seizure.
3. Patient age group < 1 year

The study was approved by the institute's ethical committee

board. Statistical analyses was done using SPSS version 20. Descriptive statistics was used as percentages and proportion to present the results.

RESULTS:

In present study a total of 92 children were admitted in emergency with first onset seizure in 6 months duration. After fulfilling the exclusion criteria, total 43 children with Neurocyticercosis were included in the study. Table 1 depicts the frequency of clinical presentation, type of seizure where generalized onset was most common with duration of seizure > 15 minutes. On imaging of brain, lesion was mostly single with most common lobe involvement was parietal. Table 2 depicts that the most common staging of lesion was colloidal followed by vesicular.

Table 1: Distribution of NCC according to clinical symptoms, seizure characteristics and lobe involvement

	Frequency (n = 43)	Percentage
Symptoms		
Fever	4	9.3%
Headache	20	46.5%
Loss of consciousness	37	86%
Vomiting	24	55.8%
Type of seizures		
Generalized onset seizure	31	72.1%
Focal onset seizure	11	25.6%
Unknown onset seizure	1	2.3%
Duration of seizure		
< 5 minutes	7	16.3%
5 – 15 minutes	10	23.3%
>15 minutes	26	60.5%
Lobe involvement		
Frontal lobe	8	18.6%
Parietal lobe	19	44.2%
Temporal lobe	3	7%
Occipital lobe	4	9.3%
>1 lobe	9	20.9%
Number of lesion		
Single lesion	32	74.4%
Multiple lesion	11	25.6%

Table 2: Distribution of Neurocysticercosis in terms of number and staging of lesions

Single lesion	Staging of NCC	n	%	Total
	Vesicular	7	16.3%	32 (74.4%)
	Colloidal	22	51.2%	
	Granular	3	7%	
Multiple lesions	Colloidal	4	9.3%	11 (25.6%)
	Granular	1	2.3%	
	Calcified + Vesicular	2	4.6%	
	Calcified + Granular	3	7%	
	Vesicular + Colloidal	1	2.3%	

When lobe involvement was compared with number of lesions, with all lobes single lesion was most common except for more than one lobe involvement where multiple lesion was most common. [Table 3]

TABLE 3: Distribution of Neurocysticercosis in terms of different lobe involvement with number of lesions

Lobe involvement	Number of lesions		
	Single lesion	Multiple lesions	Total
Frontal lobe	6 (75%)	2 (25%)	8 (18.6%)
Parietal lobe	17 (89.5%)	2 (10.5%)	19 (44.2%)
Temporal lobe	3	0	3 (7%)
Occipital lobe	4	0	4 (9.3%)
>1 lobe	2 (22.2%)	7 (77.8%)	9 (21%)
Total	32 (74.4%)	11 (25.6%)	43 (100%)

The most common seizure with type of lobe involvement was generalized onset seizure but with temporal lobe involvement, focal onset seizure was more common.

TABLE 4: Distribution of Neurocysticercosis in terms of different lobe involvement with type of seizure

Lobe involvement	Type of seizure		
	Generalized onset seizure	Focal onset seizure	Unknown onset seizure
Frontal lobe	7 (87.5%)	1 (12.5%)	0
Parietal lobe	14 (73.7%)	5 (26.3%)	0
Temporal lobe	1 (33.3%)	2 (66.7%)	0
Occipital lobe	2 (50%)	1 (25%)	1 (25%)
>1 lobe	7 (77.8%)	2 (22.2%)	0
Total	31 (72.1%)	11 (25.6%)	1 (2.3%)

It was found that most of the patients with any lobe involvement came in status epilepticus. [Table 5]

TABLE 5: Distribution of Neurocysticercosis in terms of different lobe involvement with duration of seizure

Lobar involvement	Duration of seizure		
	< 5 minutes	5 – 15 minutes	> 15 minutes
Frontal lobe	0	4 (50%)	4 (50%)
Parietal lobe	5 (26.3%)	4 (21.1%)	10 (52.6%)
Temporal lobe	1 (33.3%)	0	2 (66.7%)
Occipital lobe	0	0	4
>1 lobe	1 (11.1%)	2 (22.2%)	6 (66.7%)
Total	7 (16.3%)	10 (23.3%)	26 (60.5%)

DISCUSSION:

Seizure is the commonest presentation of Neurocysticercosis. Seizures occur in 70-90% of cases. In a series of 500 children of NCC from India, seizures were reported in 94.8% cases.[9] To my knowledge limited studies are available from rural area of India about NCC among children. Our study showed that generalized onset seizures appeared in the majority of cases in children coming to emergency with first onset seizure. It was similar to the study done among children at Karnataka, India by Sahu et al [10] where generalized seizure was most common. The finding was different from other studies where most children presented with partial seizures (84-87%). [9,14,15] particularly complex partial seizures; about a quarter had simple partial seizures.[9]

In this study, almost one-fourth of patients had seizure duration of 5-15 minutes and 60% had status epilepticus with seizure duration of >15 minutes. This finding was different from other studies where most seizures were of short duration, generally lasting for less than 5 minutes and status epilepticus was reported in 1.7% to 32% cases.[9,14,15] This difference from our study was because we have included only those patients who came in emergency with first onset seizure. Generally patients with short duration of seizure prefer to visit OPD with their complaints and patients with long duration of seizure come in emergency.

In our study, almost half of patients presented with headache and vomiting and 86% had H/O loss of consciousness. The finding was different from other study by Shrestha SP et al [16] where headache and vomiting, the features of raised ICP were present in 73.9%and 30.4% of cases respectively.

In present study three fourth of children had single lesion on MRI and one fourth had multiple lesion. The finding was

similar to other studies where majority of lesions were single. [10, 11, 12,14] It is not clearly understood as to why some cases have single and others have multiple cysts. Immunological differences may possibly account for this; defective functions of neutrophils and T lymphocytes have been reported in patients with multiple lesions only and not in those with single lesions.[15]

Our study revealed that most common lobe involvement was of parietal lobe (44.2%) followed by > 1 lobe involvement (20.9%), frontal lobe (18.6%), occipital lobe (9.3%) and temporal lobe (7%). Study done among children by Sahu et al [10] also found the similar results where the most common lobe involved was parietal lobe (44.2%) followed by frontal lobe (21.3%) and occipital lobe (11.5%). Similar results regarding lobe involvement was found by Maneesh et al [13]whose study subject mean age was 15.46 ± 7.73. Chamaria et al [12] conducted study among 6-30 years age group patients and found that most common lobe involved was frontal lobe (44.6%) followed by parietal lobe (24.2%), temporal lobe (12.4%) and occipital lobe (10%). The difference from our study may be due to different age group involvement.

In the present study three-fourth of patients had single lesion among which most common was colloidal followed by vesicular and granular nodular. Among multiple lesions, most common type was colloidal followed by Nodular calcified + granular nodular and Nodular calcified + vesicular. Study done by Gupta MM et al, [17] on CT scan vesicular stage was most common (76%). In a study conducted by Shrestha et al, [16] lesions found in CT scan were mostly in a transitional stage (61.22%), where as perilesional edema and scolex within the lesion were noted in 67% and 18% of the cases, respectively. Talukdar et al [14] reported similar CT findings.
MRI scan better defines the lesion but the older studies were CT based where vesicular stage was common. This localized edema around NCC lesions can be considered to be the cause of seizure. Possibly this may be caused by an inflammatory response due to the liberation of antigens by the cyst itself during its remodeling process. [17]

CONCLUSION:

The present study reveals that majority of NCC patients with first onset seizure were unprovoked (afebrile). Most common type of seizure was generalized onset with duration of > 15 minutes and lesion mostly located in parietal lobe. Here, colloidal was the most common stage. Magnetic resonance imaging better defines the lesion as well as precisely localizes the lesion in comparison to CT scan. It helps us to take better decision about starting of anticysticidal medicine. So MRI should be preferred as it is freely available in the current scenario. Large number of NCC patients presented with unprovoked seizure, so in developing countries neuroimaging should be done in all patients with unprovoked seizure to rule out neuroinfections.

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