



Role of Computed Tomography in Evaluation of Seizure Disorder in Children

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ABSTRACT

Aims and Objectives: To detect the incidence of different causes of seizure in childhood, to detect the lesions that are potentially treatable & to predict the prognosis.

Materials and Methods: The present study was carried out in the department of Radiodiagnosis V.S.S Institute of Medical Sciences and Research, Burla. 70 patients in the age group of 0 to 12 years presenting with clinical diagnosis of seizure were studied from Sept 2014 to Sept 2016. All patients were subjected to CT scan brain, contrast study was done wherever required.

Results and Conclusion: CT was found to be positive in 54(77%) cases showing some lesion. Most of the lesions (63%) were found to be infective in origin. Tuberculoma was found to be the most common type of lesion in children presenting with seizure. Most of the tumours were found to be astrocytic in origin and benign.

Keywords: Tuberculoma, Seizure.

INTRODUCTION

A seizure is defined as a sudden, paroxysmal electrical discharge from the central nervous system resulting in involuntary motor, sensory or autonomic disturbances with or without alteration in sensorium. The manifestation of seizure depends on the threshold of brain to manifest a clinical seizure. The age and neurodevelopmental maturity status determine the clinical manifestation and type of seizure disorder. About 5% children are at risk of experiencing a seizure.

The age of the child is important in determining the cause of seizure. In very young infants three etiological factors are considered to be of major importance i.e., intracranial birth injury with haemorrhages, congenital defects of brain & anoxia caused by some difficulty during gestation and birth. In the later part of infancy and early childhood, acute infections are most frequent cause. In mid childhood idiopathic epilepsy appears as an important cause of convulsion. In older children convulsions are mainly due to intracranial infections and tumours.

Early recognition of the treatable causes of these common neurologic symptoms & institution of proper and adequate treatment is essential for a normal physical, mental & psychological development of a child.

In this context the revolutionary introduction of the CT for the investigation of intracranial pathological conditions has been a great boon, both for the diagnosis of cerebral lesions as well as clinical management of patients with neurological disorder. Further higher modalities include MRI, Magnetoencephalography

AIM AND OBJECTIVES

1. Detect the incidence of different causes of seizure in childhood.
2. Detect the lesions that are potentially treatable.
3. Predict the prognosis.

MATERIAL AND METHODS

Source of data-Cases of seizure in age group 0-12 yrs subjected to CT scan brain in department of Radiodiagnosis in VSSIMSAR, Burla

Study period - 2 years (September 2014 – September 2016)

Study design- hospital based cross sectional study

Inclusion Criteria- All patients in the age group 0-12 yrs presenting with seizure.

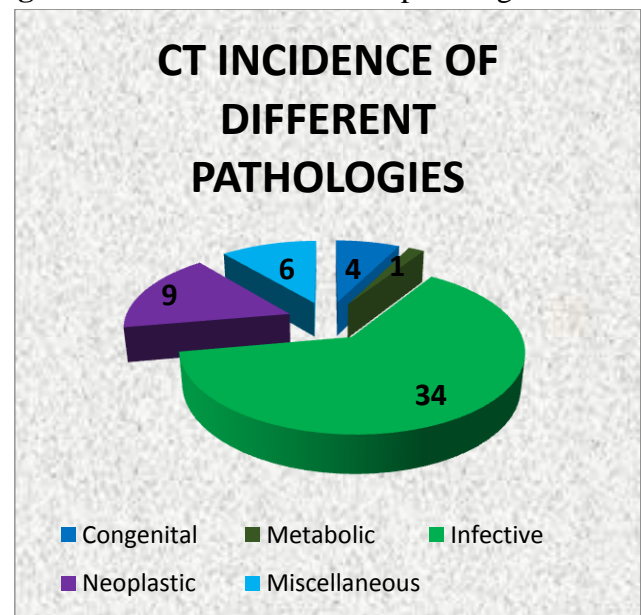
Exclusion Criteria- 1. Patients with history of trauma. 2. Patients with history of intracranial surgery.

RESULTS

More number of male children (68.5%) presented with seizures than female children in the 0-12 years age group. Maximum numbers of cases (34%) were found in the 6-9 years age group. Maximum numbers of cases were clinically diagnosed as GTCS (43%). Generalized seizures both primary and secondary accounted for 44 cases (63%). Headache and vomiting were the two most common presenting symptoms (46% and 27% respectively) associated with seizure.

No abnormality was detected on CT study in 16 out of 70 cases (23%). Maximum numbers of lesions, i.e. 12 (22%) were located in parietal lobe. Frontal lobe was the next most common site (19%). Similar numbers of lesions were noted in the posterior fossa (18.5%). Infective etiology was seen in 63% cases, neoplastic causes in 16.7% cases, congenital causes in 7.4%.

Fig1: CT incidence of different pathologies



Incidence of Tuberculoma was seen to be highest in this study, 16 out of 70 cases (23%). Next most common lesion was NCC (10%). Incidence of tumour is seen to be 16.7% (9 cases) of which 5 cases (56%) have shown a posterior fossa location. 55.5% (30 cases) of the lesions were isodense on plain CT. 11 out of 16 Tuberculomas were isodense. All of the NCC and meningitis are isodense on plain CT. Oedema was seen in 63% of the lesions, 12 out of 16 (75%) of the Tuberculomas showed perilesional oedema. Hydrocephalus accompanied 15% of the lesion (8 out of 54 cases) Ring type of enhancement was seen most commonly (40.7%). Most of the Tuberculomas (12 out of 16 cases) showed ring type of enhancement pattern. 4 out of 7 (57%) of the NCC showed ring enhancement. All the abscesses and CPs showed marginal ring like enhancement pattern. Gyriiform enhancement was seen in the single encephalitis case.

Figure 2:Distribution of different lesions on CT

Lesions	No of cases	%
TB	16	23
NCC	7	10
Brain abscess	4	6
Meningitis	5	7.1
Encephalitis	1	1.4
CMV	1	1.4
Cerebellar astrocytoma	1	1.4
Craniopharyngioma	2	2.8
Medulloblastoma	1	1.4
Ependymoma	2	2.8
Glioma	1	1.4
Choroid plexus papilloma	1	1.4
Astroblastoma	1	1.4
Corpus callosal agenesis	1	1.4
Holoprosencephaly	1	1.4
Tuberous Sclerosis	1	1.4
Schizencephaly	1	1.4
Haemorrhage.	1	1.4
HIE	5	7
Leucodystrophy	1	1.4
NAD	16	23
Total	70	100

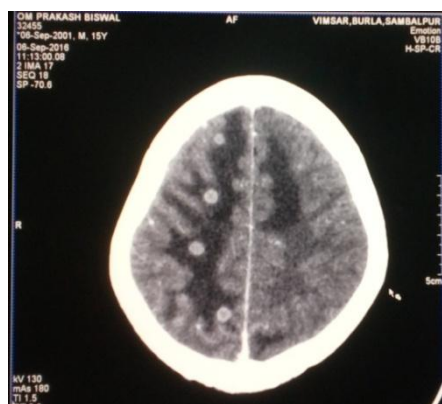


Fig -3: Tuberculoma

CECT shows multiple small ring enhancing lesions with surrounding edema.



Fig-4:Cytomegalovirus infection

NECT shows ventricular enlargement and periventricular calcification.

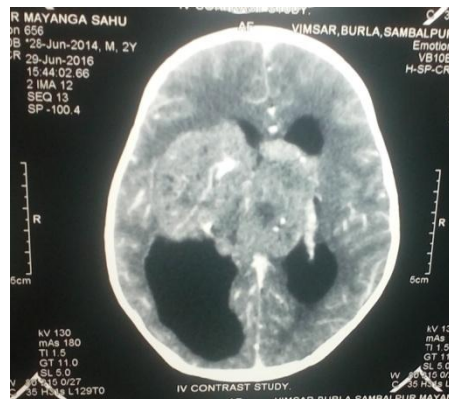


Fig-5:Choroid plexus papilloma

CECT shows a well defined lobulated intraventricular mass taking strong enhancement with associated enlargement of lateral ventricles.

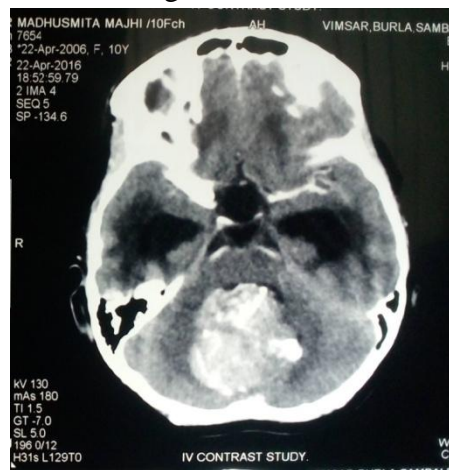


Fig-6: Ependymoma

CECT shows a heterogeneously enhancing mass within the fourth ventricle with few calcification foci and associated hydrocephalus with dilatation of temporal horns of lateral ventricle.

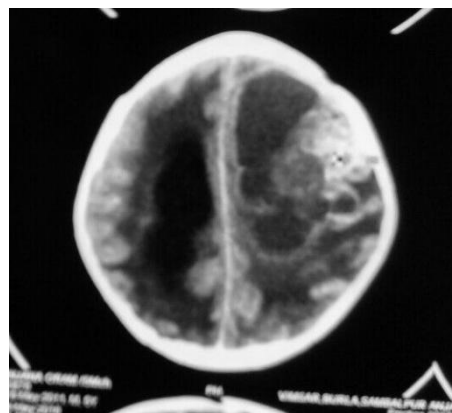


Fig-7:Astroblastoma

CECT shows a large cystic solid lobulated lesion in the left frontoparietal lobe with surrounding edema. The solid part is taking strong enhancement.



Fig-8:Corpus callosal agenesis

NECT shows high riding third ventricle, parallel lateral ventricles ,interhemispheric interdigitations.

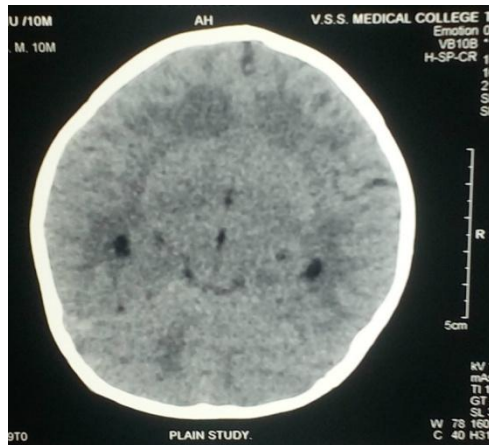


Fig-9: Semilobar Holoprosencephaly

NECT shows absent falx and fused basal ganglia.



Fig-10: Open lip schizencephaly

NECT shows gray mater lined CSF cleft extending from endyma of lateral ventricle to the periphery

DISCUSSION

In our study maximum number of cases were found in the 6-9 years age group (34%). This observation was in consistence with *Achari (1982)*. *Srinivasan et al (1969)* who had also observed that over 90% of convulsive disorders have their onset during early years of life. In present study, 68.5% were males and 31.5% were females.. Different studies reflect that seizures are more common in males than

females as seen by *R.S. Wadia et al¹* , *P.J. Patel et al²* . *Taylor and Ounsted (1971)* have attributed to the lower incidence in female children due to rapid rate of cerebral maturation and myelinisation leading to faster escape through the period of risk, which is largely age dependent. The commonest pattern of seizure in our study was generalized seizure, seen in 44 cases (63%). *P.J. Patel (1986)²* in his study found that commonest presentation was generalized seizure followed by partial seizure. CT examination revealed pathological finding in 54 out of 70 patients i.e. 77%. In survey of patients with established seizures from tertiary centres, 60% - 80% may have abnormal CT scans (*Gastaut H, 1976*)³. Most of the infective lesions (30 cases and of 54) were located at the frontal, parietal, occipital and temporal lobes (55.5%) as observed in the present study. According to *Penfield and Jasper et al⁴* and *Madguire and Courjon (1978)⁵*, lesions of the frontal, parietal and occipital lobes seem to carry the highest risk of seizure as noted in a study of 127 cases. *De Castro et al (1991)⁶* in his study found that cerebellum is the most common site for tuberculoma in children. In present study the incidence of Tuberculoma was seen to be highest (23%). Next most common entity was NCC (10%). Brain abscess (6%) turned out to be the third most common lesion in our study. In a study in Indian children with seizures *Chandy et al⁷* had found NCC to be an important cause, giving the CT appearance of a single, ring lesion. *Lund M (1952)⁸* in his review on “Epilepsy associated with intracranial tumours” stated that majority of tumours that present only with epilepsy tend to be benign. Thus astrocytomas are complicated by epilepsy in 60-70% of cases. The incidence of astrocytic tumours in our study was 33.3%.

CONCLUSION

CT is an indispensable diagnostic modality in the evaluation of seizures. Those cases which showed no lesion on CT were categorized into idiopathic seizures. CT is commonly ordered in patients presenting with new onset seizure to an emergency department. It has been proved beyond doubt that

CT is the most meaningful procedure in the diagnosis, treatment and follow up of patients with infective lesions of brain.

Most of the children presenting with seizures were in the 6-9 yrs age group. Generalised tonic clonic seizure was the most common type. Headache was the commonest associated symptom. CT was found to be positive in 54(77%) cases showing some lesion. Most of the lesions were located at the cerebral hemispheres, most of which were infective in origin. Most of the posterior fossa lesions were tumours. Perilesional oedema was the most common (63%) associated CT finding in all lesions. Ring like enhancement was the most common finding on contrast enhanced CT. It was seen in majority of the infective lesions (NCC, Abscess, Tuberculoma etc). Only bony change that was detected was sellar destruction in one case of craniopharyngioma. Most of the lesions (63%) were found to be infective in origin. Tuberculoma was found to be the most common type of lesion in children presenting with seizure. Most of the tumours were found to be astrocytic in origin and benign. CT was highly accurate in predicting the possible histological diagnosis in majority of cases.

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