

A STUDY OF CLINICORADIOLOGICAL CORRELATION IN CHILDHOOD SEIZURES

Dr Vivek Chopra¹, Dr Kanika Goyal², Dr Madhusudhan Gupta³

1. Dr Vivek Chopra, PG, Department of Pediatrics, NCMCH, Israna, Panipat, Haryana, India
vivekchopra7070@gmail.com
2. Dr Kanika Goyal, PG, Department of Radiology, AMCH, Ambala, Haryana, India,
kanikagoyal3637@gmail.com
3. Dr Madhusudhan Gupta, Professor, Department of Pediatrics, NCMCH, Israna, Panipat,
Haryana, India, drmadhusudhangupta@gmail.com

Corresponding author

Dr Madhusudhan Gupta, Professor, Department of Pediatrics, NCMCH, Israna, Panipat, Haryana, India, drmadhusudhangupta@gmail.com

Abstract

Background: Seizures are the most common neurological illness in the pediatric population and account for 1% of all emergency department (ED) visits and 2% of all visits to children's hospital EDs. Pediatric epilepsy presents with various diagnostic challenges. Neuroimaging, especially structural neuroimaging and preferably MRI brain, plays an essential role in diagnosing, managing, and guiding pediatric epilepsy treatment. **Aims & Objectives:** *To study imaging findings of various Clinicoradiological conditions in Seizures children.* **Materials & Methods:** Potential cases were identified through a search of the Emergency department and Radiology Department databases. Cases included pediatric patients of age group between 1 to 12 years, who were admitted in Pediatric ward of NC Medical College And Hospital, who had a first seizure and a CT scan before discharge from the ward. Infants younger than 1 year of age and above 12 years of age, children with simple febrile seizures, with history of Neonatal Seizures. 100 children met the inclusion criteria. **Observation and Result:** This study included 100 children, 65 boys and 35 girls. Their age range at the time of presentation in the hospital was between 1 year to 12 year. Twenty four of these children (24%) had abnormal CT results. Table 1 describes the types of seizures with no. of cases, with maximum cases of Primary Generalized Tonic Clonic (74%), simple Partial (4%), Complex Partial (7%), Focal with Secondary generalization (8%), Absence (6%), Myoclonus (1%). Table 2 describes types of CT abnormalities, Among the different types of CT findings, Calcification was the most common lesion observed. **Conclusion** Neuroimaging, preferably CT brain, is the most helpful tool for the etiological diagnosis of afebrile seizures. In our study, seizures secondary to perinatal insult/hypoxic insult followed by infections were major causes. Improvement in peripartum and perinatal care coupled with a targeted Tuberculosis control program may help in reducing these potentially preventable causes.

Keywords: Seizures; Children; Neuroimaging, CT

Introduction

Seizures are the most common neurologic disorder and a major health problem in many developing countries in the paediatric age group, which needs more attention to ablate from these stressful events. Convulsions in childhood are among the most common acute and life threatening problems which cause the parents immediately consult a doctor. The convulsive disorder is the expression of a sudden, excessive disorderly discharge of neurons in either a structurally normal or diseased cortex. The discharge results in an almost instantaneous disturbance of sensation, loss of consciousness, convulsive movement or some combination of these. Less than one third of seizures in children are caused by epilepsy, a condition in which seizures are triggered recurrently within the brain. Accurate diagnosis about the type of convulsions is important since their etiology, therapy and prognosis differ for the different types. It is important to perform a careful evaluation to look for the cause of seizures as well as to assess the need for treatment with antiepileptic drugs and estimate the potential for response to treatment and remission of seizures in the future. The history can provide important information about the type of seizures. Seizures that occur during early morning hours or with drowsiness, particularly during the initial phase of sleep are common in children. Irritability, mood swings, headache and subtle personality changes may precede a seizure by several days. Aside from the description of seizure pattern, the frequency, time of day, precipitating factors and alteration in the type of seizures are important. Although that frequency of generalized tonic clonic seizures is readily documented, absence seizures are underestimated.

Seizures are defined as “a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain”. The incidence of epilepsy is 1% [1]. Prevalence rate is 5.59/1000 population with no gender or geographical differences making it a common neurological condition. It has lot of psychological, social and functional disabilities in children affected and their families. Neuroimaging becomes important and mandatory in the work up for epilepsy in localisation and lateralisation of the seizure focus.

Materials and Methods

Potential cases were identified through a search of the Emergency department and Radiology Department databases. Cases included pediatric patients of age group between 1 to 12 years, who were admitted in Pediatric ward of NC Medical College And Hospital between January 2022 and December 2022, who had a first seizure and a CT scan before discharge from the ward. Infants younger than 1 year of age and above 12 years of age, children with simple febrile seizures, with history of Neonatal Seizures, history of Trauma, history of cerebral palsy, history of Global development delay, history of Meningitis, known case of Metabolic disorder were excluded. 100 children met the inclusion criteria. From the outpatient and inpatient records, we obtained the following information: age at the time of the seizure, recent and remote history, results of the neurological examination at the time of presentation, seizure type, and results of investigations done in the hospital, such as CT, and laboratory tests. Following the current guidelines of the International League Against Epilepsy, we categorize seizure type as convulsive (generalized or partial) when it included a motor component, such as tonic-clonic, clonic, or tonic, and as non convulsive when impairment of consciousness occurred without a

motor component. Seizures were also classified according to pathogenesis as cryptogenic, acute symptomatic, or remote symptomatic. Cryptogenic seizures are those that occur with no clear cause in otherwise normal people with normal neurological examination. Remote symptomatic seizures are those without an immediate cause in patients with either an identifiable previous brain injury or a static encephalopathy that is known to be associated with an increased risk of seizures. A seizure is considered acute symptomatic when it occurs during an acute illness in which there is a known neurological insult or systemic metabolic dysfunction. Complex febrile seizures (those lasting more than 15 minutes, focal, or more than one episode in 24 hours) were classified as a separate group.

All CT procedures were performed on a Siemen's 16 Slices CT Scan machine. Only abnormalities directly involving the brain were analyzed. A few of the patients had previous scans, some demonstrating abnormalities (e.g., hydrocephalus), but we considered only the CT results from immediately after the first seizure. The Fisher exact test was used to calculate the statistical association between seizure type and cause and the rate of CT scan abnormalities.

Observation and Results

This study included 100 children, 65 boys and 35 girls. Their age range at the time of presentation in the hospital was between 1 year to 12 year. Twenty four of these children (24%) had abnormal CT results. Table 1 describes the types of seizures with no. of cases, with maximum cases of Primary Generalized Tonic Clonic (74%), simple Partial (4%), Complex Partial (7%), Focal with Secondary generalization (8%), Absence (6%), Myoclonus(1%). Table 2 describes types of CT abnormalities, Among the different types of CT findings, Calcification was the most common lesion observed.

Table 1: Types of seizure with No. of cases

Type of seizure	No. of cases
Primary Generalized Tonic Clonic	74
Simple Partial	4
Complex Partial	7
Focal with secondary generalization	8
Absence	6
Myoclonus	1

Table 2: Types of CT abnormalities with No. of Cases

Type of CT abnormalities	No. of Cases
Granuloma	8
Infarct	4
Calcification	7
Ventricular Dilatation	4
Atrophy	1

INFARCT: Of the total 24 abnormal findings, Infarct accounted for 4 cases. Of which GTCS 2 case, simple partial seizure 1 case, focal with secondary generalization 1 case.

GRANULOMA: Of the total 24 abnormal CT findings granuloma accounted for 8 cases. Of which GTCS 5 cases, simple partial seizure 1 case, focal with secondary generalization 2 cases.

CALCIFICATION: Of the total 24 abnormal findings, Calcification accounted for 7 cases. Of which GTCS 3 cases, focal with secondary generalization 4 cases

VENTRICULAR DILATATION: Of the total 24 abnormal findings, Ventricular dilatation accounted for 4 cases. Of which all are GTCS.

ATROPHY: Of the total 24 abnormal findings, Atrophy accounted for 1 case which is simple partial seizure.

In the present, of total 100 cases studied, 74 cases were GTCS. Of which 14 cases showed abnormal CT findings as ,Granuloma 5, Infarct 2, Ventricular dilatation 4 , Calcification 3. Out of total 100 cases studied, 4 cases were simple partial seizures. 3 showed abnormal CT findings as Granuloma 1, Infarct 1, Atrophy 1. Out of total 100 cases studied, 8 cases were focal with secondary generalization of which 7 showed abnormal CT findings as , Granuloma 2, Infarct 1, Calcification 4. Cases which presented as complex partial, absence seizures, myoclonus did not yield any abnormal finding on CT brain study.

DISCUSSION

The magnitude of problems of convulsions as leading manifestations of a medical or neurological disease can hardly be overstated. The magnitude of the problem will be evident from the figures given below. Pediatric department statistics for the year 2022, NC Medical College & Hospital shows Total number of admissions as 2211. No of children admitted with convulsions were 215. So 9.7 % of admissions in this hospital is with seizure disorder. Most of the published observations and studies on CT findings in seizure disorder were either they concentrate on neonates or both neonate and childhood. Many studies of CT findings in seizure disorders were conducted on adults than on children.

The role of radio-imaging in partial seizures in children has already been an established fact [2,3,4]. Most of the studies in children with generalized seizures have been done in general population without discriminating between provoked and unprovoked seizures. Study regarding role of radio-imaging in first apparent unprovoked generalized seizure in childhood population (0-18years) is debatable point. In the present study 100 patients of pediatric age group were studied, who were clinically diagnosed as case of epilepsy, with no provoking factors. Generalized seizure accounted for the majority of our cases (74%), which is in agreement with other studies in Africa [6] and India [7], showing preponderance of GTCS of 60-90% [5].

CONCLUSION:

Both focal with secondary generalisation seizure (87.5%) cases and simple partial seizures (75%) have high yeild abnormal findings in CT. In generalized seizures, focal with secondary generalization and simple partial seizures have high yield when compared to primary generalized tonic clonic(18.9%) which yielded low abnormal findings. Other forms of seizures like absence, complex partial, and myoclonus were in the low yield group showing no abnormality in the CT brain. The commonest finding in the CT brain was granuloma followed by calcification. Nowadays the CT facilities are available in many government and private set ups and are also cost effective. So the inference of the study is that CT should be frequently recommended in cases of seizure disorders for better evaluation and treatment of patient.

Funding: No funding sources

Conflicts of interest statement: The authors have no conflicts of interest relevant to this article.

Reference

1. Hauser WA. The prevalence and incidence of convulsive disorders in children. *Epilepsy* 1994; 35(suppl 2):S1-S6.
2. Garg R K, Singh MK, Mishra S, et al. Single enhancing CT lesions in Indian patient with seizures. *Areview. Epilepsy Res* 2000; 38: 91-104.
3. Chang T, Acosta MT, Rosser T, et al. Neuroimaging in children during the acute evaluation of new onset seizures. *Ann Neurol* 2002, 52:S134.
4. Hsieh DT, Chang T, Tsuchida TN, et al. New onset afebrile seizures in infants- role of Neuroimaging. *Neurology* 2010; 74:150-156.
5. Das SK, Sanyal K, Neuroepidemiology of major neurological disorders in rural Bengal. *Neurol India* 1996; 14: 47-58.
6. Jackson N, Ridge CA, Delanty N: Imaging in patient with □first seizure. *Ir Med J.* 2006 Jun; 99(6): 173-5
7. Resta M, Palma M, Dicuonzo F, et al. Imaging studies in partial epilepsy in children and adolescents. *Epilepsia* 38:1187-1193.