

## Short Communication

# Role of EEG and CT scan in partial seizures in children

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**Seizures disorders are the most prevalent serious neurological disease. Partial seizures are the most common form of seizures in children. This study was carried to determine the etiology and intracranial lesions in children with partial seizures with prospective study through the period of 5 years. One hundred and seventy two children with partial seizures (>2 attacks) were included in the study. All children had contrast CT scan of head and EEG. About 70% of children had their first episode of seizure before 6 years of age. The most common type of seizures was complex partial and the most common lesion on CT scan head was ring enhancing lesion (56.07%). For diagnosis of partial seizures detail history and CT scan head are essential.**

**Key words:** Partial seizures, neurocytotoxicosis, tuberculoma, CT scan.

## INTRODUCTION

Epilepsy is a condition of chronic, recurring seizures and its most disabling aspect is unpredictability of when and where the next seizure will occur. Its etiology is complex and heterogeneous. Its prevalence varies in relation to ethnicity, geography, age and sex (Rose and Penry, 1973; Quinones and Lira, 2004; Sharma, 2005). Seizure frequency, type and duration are other important characteristics of epilepsy in a population. These peculiarities are known to affect other neurological, behavioral and scholastic characteristics.

The incidence of epilepsy has been reported to range from 0.8 to 1.1% (Agrawal et al., 1998) and approximately 50% of all cases of epilepsy start in childhood.

As per international league against epilepsy (ILAE 1989) all epilepsy cases are classified into two categories e.g. partial seizures and generalized seizures (Commission on Classification and Terminology of International League Against Epilepsy, 1989). In addition to its value as a diagnostic aid, EEG may be helpful in classifying the seizure, suggest an etiology, guide clinical management as well as provides evidence of localisation when surgery is planned (Yamamoto et al., 1987).

Because of a significant chance of finding some structural cerebral lesion, an imaging procedure such as CT scan is indicated essentially for every child with a

partial seizure (Sotijjanov, 1982).

## Objective

The aetiological factors of epilepsy differ markedly in children as compared to adults. This study was carried out for determining the underlying etiology on CT scan Head.

## MATERIALS AND METHODS

The study was conducted prospectively over a five year period between January 2004 to December 2009 in the Department of Pediatrics, HIHT Rishikesh city.

One hundred and seventy two children with partial seizures defined as per ILAE. All these children had two or more than two attacks of unprovoked partial seizures.

Children with neonatal convulsions, febrile convulsions and acute CNS infections were excluded. Both old and new patients attending the clinic were included. All the patients were clinically examined and underwent one interictal Electroencephalogram (EEG) and Computed Tomography (CT) scan after clinical evaluations and were diagnosed.

## RESULTS

Of the 172 children with partial seizures, 112 (65.11%) were male and 60 (34.88%) were females. The age of patients ranged between 6 months and 12 years. 69.8%

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**Table 1.** Type of EEG abnormality in partial seizure groups.

| EEG changes                                       | Partial seizure {No. (%)} |
|---|---------------------------|
| Normal EEG  | 47 (27%)                  |
| Abnormal EEG                                      | 125 (73%)                 |
| (a) Asymmetry                                     |                           |
| (b) Asymmetry with sharp wave                     |                           |
| (c) Asymmetry with sharp wave and spike           | 18 (14.4%)                |
| (d) Abnormal background with sharp wave           |                           |
| (e) Abnormal background with sharp wave and spike | 8 (6.4%)                  |
| (f) Sharp wave alone                              | 34 (27.2%)                |
| (g) Spike alone                                   | 25 (20%)                  |
| (h) Sharp wave and spike                          | 40 (32%)                  |

**Table 2.** The etiological profile on CT Scan Head of partial seizures in the children.

| Lesions               | Number | %     |
|-----------------------|--------|-------|
| Normal                | 65     | 37.79 |
| Symptomatic           | 107    | 62.20 |
| <b>Ring enhancing</b> |        |       |
| Single                | 54     | 50.46 |
| Multiple              | 06     | 5.60  |
| Cortical infarct      | 12     | 11.21 |
| Cerebral atrophy      | 10     | 9.34  |
| Dilated ventricles    | 10     | 9.34  |
| Encephalomalacia      | 06     | 5.60  |
| Calcifications        | 04     | 3.73  |
| Brain tumor           | 02     | 1.86  |
| Gliosis               | 03     | 2.80  |
| Porencephalic cyst    | 02     | 1.86  |
| Subdural effusion     | 02     | 1.86  |

of children (120/172) had their first episode of seizure before the age of six years. The seizures type was as follows:

- (a) Simple partial - 38 (22.09%)
- (b) Complex partial - 95 (55.23%)
- (c) Partial seizures with Secondary generalization - 39 (22.67%) (Table 1).

The etiological profile on CT Scan Head of partial seizures in these children is shown in Table 2.

Intracranial lesions were detected in 107 out of 172 children. The most commonly observed lesions on CT scan of head were ring enhancing lesions which were multiple in 06 children and single in 54 children. Of these 60 patients 22 were diagnosed as tuberculoma using radiological criteria and supportive evidence of tuberculosis elsewhere. Thirty-five were treated as

neurocytotoxicosis. Immunological tests for NCC and follow up CT scan were not done due to economic constraints.

## DISCUSSION

Partial seizures in children represent a large percentage of epilepsy requiring an accurate diagnosis for appropriate management. A study of a cohort of 440 children observed partial seizures constitute a large percent (41.7%) of seizure types in children (Kramer et al., 1998). In developing countries like India partial epilepsy is reported to be more frequent in all age groups (Senanayaka and Romer, 1993).

Observation in our study was quite similar to that observed by Dooze et al. (1998); they reported abnormal EEG in 81% of patients with partial seizures and 78% of

patients with generalised seizures respectively in different studies (Doose et al., 1998).

Analysis from clinical data and investigations revealed that ring enhancing lesions as neurocytotoxicosis were the commonest lesion. This has also been observed by other studies (Kapoor et al., 1998) CT studies of partial seizures in children are very helpful in detecting small intracranial lesions and are reported to have a higher yield than those observed with generalized epilepsy (Misra et al., 1994). Abnormal scans have identified in 60 to 70% children with partial seizures (Kalra, 2000). The findings of the present study are similar to other studies so far as the basic patterns of intracranial structural lesions are concerned (Kumar et al., 1990; Garg et al., 1999; Wadia et al., 2001).

The age of onset of epilepsy has been reported in the first two decades of life in 75 to 80% patients (Mathai, 1986; Thornton and Robertson, 2002) and in 68.8% before 15 year of age in another study. Troster (1982) has found that 68% cases had age of onset before 20 years. The onset of epilepsy is in the first two decades of life in 80% of the patients in Mathai's study (Mathai, 1986).

Age-specific prevalence rates were highest in the second decade in men and in the third and fourth decades of women. The age-specific prevalence was found to be higher with increasing age (Hauser and Kurland, 1967).

Thus partial seizures is the most common neurological disease of childhood, which causes great impact on the social as well as economic aspect of the under developed countries. Numerous relatively benign, episodic spells often are misdiagnosed and even treated as seizures. Therefore correct diagnosis and appropriate treatment should be more important.

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