

Prediction of Epilepsy in Febrile Seizure

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ABSTRACT

The EEG records of all referrals to the EEG Unit of Salmaniya Medical Centre (SMC) in two years – 125 in number were examined. The parents of 90 patients were interviewed 2-3 years after obtaining EEG records for evaluation of known predictors for development of non-febrile seizures or epilepsy. Development from febrile into non-febrile seizures was detected in 7.7% of the cases. The high incidence of epilepsy among the cases is probably due to methodological differences and patients selectivity. Factors such as recurrence rate and the presence of epileptogenic changes in the EEG were significantly related to the development of epilepsy. Meanwhile the difference between the febrile seizure and non-febrile seizure cases in age at onset and family involvement was important but did not reach significance.

Febrile seizures account for the majority of seizures among children¹. It is the highest childhood neurological disease where about 5% of all the children experience seizures early in their childhood when feverish^{2, 3, 4, 5, 6}

The majority of clinicians agree that children with febrile seizure are at a greater risk of developing non-febrile seizures or epilepsy in the future in comparison with children who without a positive history^{7, 8}. However, the magnitude of this risk varies in different studies according to the definition of seizures, duration of follow-up period and patient's selectivity⁹.

High recurrent rate, convulsions with fever under 38.5°C, pre-existing neurological abnormality, complicated initial seizure, family history of non-febrile seizure and epileptogenic changes in the EEG were

among the listed risk factors^{10, 11, 12}. The significance of these factors was differently stressed upon in the reported studies.

In this study, some of the above mentioned factors were tested in a group of febrile seizure patients followed-up for 3 years after their initial seizure.

METHODS

The one hundred and twenty five (125) children diagnosed as febrile seizures and who were referred to the EEG unit at Salmaniya Medical Centre (SMC) in the period between July 1984 to June 1986 constitute the study sample. The diagnosis was made by qualified pediatricians from the Pediatric Department at SMC. The initial clinical information was obtained mainly from the request form. The form usually does not give adequate information to identify the type of seizure involved. The electroencephalographic study was of routine type, done 48 hours after the attack in all cases. The EEG records were examined for specific epileptogenic abnormalities i.e. spikes or sharp transients with or without slow wave component that can be detected above the background rhythm^{13, 14, 15}.

Two to three years later parents of ninety patients (72%) were interviewed. The study sample was reduced to 90 cases as 35 cases were lost in the follow-up period. The main reason was failure to trace the address (21) followed by difficulties in obtaining the correct address (10), left the country (3) and death (1).

A special form was completed by the end of the interview. The interview form was designed and used by the author in an earlier study, to obtain information about the number of repeated attacks, the occurrence of non-febrile seizure, presence of similar condition among near relatives, prophylactic use of anticonvulsant drugs, prevalence of behavioural disorders and parental prospective view of the nature of the illness¹⁶.

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The cases that developed febrile seizures followed by non-febrile seizures (NFS) were compared with those who developed febrile seizures only (FS). Known predictors of epilepsy like age at onset, recurrent rate, family history of febrile seizures and the presence of epileptogenic changes in the EEG were evaluated as predictors of future epilepsy. The Muntel-Haenzel chi-square test was used to test significance.

RESULTS

Subsequent Epilepsy or Non-Febrile Seizure

Seven patients (5 males, 2 females) had febrile seizures followed by non-febrile seizures. These seven patients were 7.7% of the total febrile seizures. The males predominate in both groups by ratio of 1.6:1.

Age at Onset

The mean age at onset was similar in both groups (1.7 months). However, a higher proportion of NFS cases had their initial seizure before one year of age compared with the FS. The rate ratio was 3 with X^2 of 2 which was not significant at the 5% level.

Number of Febrile Seizures

The cases were distributed to those who had ≥ 5 attacks and those who had less than 5. Five cases of the NFS had 5 or more attacks compared to 21 cases in the FS group. The rate ratio was 6.2 which was highly significant ($X^2 = 6.6$, $p < 0.01$).

Family Involvement

Thirteen subjects were known to have a parent with a history of febrile seizure. Two of these developed non-febrile seizure. The rate ratio of subsequent epilepsy was 2.5 among those known to have a parent with history of febrile seizures. The difference did not reach statistical significance.

Epileptogenic Activities in the EEG

EEG activities indicative of epilepsy was observed in 3 records of the NFS compared to 11 in the FS. The rate ratio was 3.8 with a X^2 of 3.9 ($P < 0.05$).

DISCUSSION

Subsequent Epilepsy or Non-Febrile Seizure

Several studies reported different incidence rates of epilepsy among follow up febrile seizure children.

High rates of subsequent seizures has been noted in patients attending speciality clinics^{8, 11}. However, in cohort studies of unselected population, the rate did not exceed 4%^{4, 5, 9}.

The rate of epilepsy in our series (7.7%) was higher than those reported in cohort studies and lower than those from speciality clinics. This might be explained by the assumption that a higher proportion of cases at risk of epilepsy were referred to the EEG unit. At the same time the short duration of follow up period might have an impact on the final number of NFS cases.

Age at Onset

In our series, there was no definite relationship between the age at onset and the development of subsequent epilepsy.

The association between this factors and epilepsy did not reach the same significant level reported in other studies^{11, 17}.

Number of Febrile Seizures

The relation between the number of febrile seizures and subsequent epilepsy was investigated in some studies^{9, 11, 17}. The number of febrile seizures was identified as a predictor of epilepsy with the exception of Nelson and Ellenberg who found a positive relationship only if the neurological status was abnormal⁹. In our series, the risk of subsequent epilepsy was related to the number of febrile seizures if they reach 5 or more attacks.

Familial Involvement

The importance of family history of febrile seizure in the prognosis of an individual risk of subsequent epilepsy is unknown. In our series, however the risk of subsequent epilepsy was slightly higher among those who had a parent with a history of febrile seizure. The difference did not reach significance probably due to the small sample size.

Epileptogenic Changes in the EEG

The significance of specific EEG findings and the development of epilepsy among febrile seizure patients is inconclusive. In our series, the results were similar to those reported by Tsuboi¹¹. The presence of epileptogenic abnormalities was found to be a significant predictor of epilepsy.

CONCLUSION

Children who had presented with febrile seizure and been referred for EEG study were evaluated. In two-thirds of the subjects, their status 3 years later were examined for the development of non-febrile seizure or epilepsy. The rate of development of epilepsy was 7.7%. Children with EEG abnormalities indicative of seizure disorder and with recurrent fits (> 5) were more likely to develop epilepsy. Factors such as age at onset and family history were associated with the development of epilepsy, but did not reach the same importance.

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METHODS

In order to investigate the relation between the electromagnetic field and the cancer cases we had studied the electromagnetic field in terms of the

exposure to a high electromagnetic field would change the behaviour of such current. Ongoing research seems to indicate that electric and magnetic fields sufficient to affect health exist only near power lines or specialised industrial or research laboratories. The fact has made the Central Electricity Generating Board (CEGB - UK) to raise their budget to fund research into the health effects of electricity and particularly of people's exposure to magnetic field from electrical appliances in and around their homes and workplaces. Weinheimer and Leeper and Tomenius et al. had reported that environmental exposure to electromagnetic field

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