

Quantitative Electroencephalography in the Children with Various Types of Tic Disorders

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ABSTRACT

Despite the long period of scientific study of hyperkinesia in children it remains one of the most prominent challenge for contemporary neurologists. The aim of present paper is to estimate the role of computer electroencephalographic (EEG) findings in establishing the etiology, pathogenesis of tic disorders for prognosing the course of disease and choosing adequate therapy. 242 patients (194 males, 48 females) with various types of tic disorders in the age from 4 to 15 years old were investigated. 67 children were subjected to Quantitative EEG investigation, which revealed the different types of pathological patterns in 41 (61%) of cases. Obtained data gave us the possibilities to make some changes in produced chemotherapy and involve in treatment anticonvulsant (sodium valproate - Depakin). The improvement of clinical picture and course of disease and long remission was observed. This fact proves a practical importance of QEEG investigation in children with various types of tic disorders.

KEYWORDS: *tic disorders, quantitative electroencephalography, brain mapping, sodium valproate*

On the contemporary stage the problem of understanding tic disorders is due to its cardinal characteristics:

1. The frequency of disease in children which according to various authors ranges from 5-7% to 50%;
2. Its wane and wax character and its disposition to frequent recurrences;
3. Resistant and medicine-dependant forms of tic disorders;
4. Coexistence psychoneurological symptoms and syndromes which cause the difficulties in differential diagnosis.

Lately significantly has increased the role of EEG for the diagnosis "functional diseases", mainly neurotic, psychic, emotional, behavioral and cognitive disorders, psychosomatic diseases. It is suggested that this new and significant function of EEG wouldn't be realized completely without computer analysis and imaging of EEG data.

The aim of our study was to estimate the role of Quantitative EEG findings in establishing the etiology, pathogenesis of tic disorders for prognosing the course of disease and choosing adequate therapy.

MATERIAL AND METHODS

242 patients with various types of tic disorders of age from 4 to 15 years were investigated. According to the L.S Gittik classification the patients were divided into the following groups:

I. Organic tics - 77

1. Rheumatic tics - 22
2. Residual-organic tics - 55

II. Generalized tics - 24

(Gilles De La Tourette Syndrome)

III. Nonorganic tics - 141

1. Neurotic tics - 92
2. Functional tics - 49

7 patients were observed to have the coexistence of epileptic syndrome and tic disorders.

All patients underwent the subtle anamnestic, clinical somatic and neurological investigations. Also routine paraclinical examinations were produced for revealing infections and the organic pathology of brain. (echoencephalography, electroencephalography, CT).

Electrophysiological investigation was produced on the device "Brain Surveyor Saico" in the following programs:

- Visual on-line analysis of spontaneous EEG activity;
- Quantitative analyses of power spectrum to all frequency diapasons;
- Spectral analyses of distribution activity along 4 frequency diapasons (alpha, beta, theta, delta) and its colored topography on the cortex.

67 children with tic disorders in the age from 4 to 15 years old were investigated electrophysiologically. During EEG records two types of synchronization were estimated:

1. High amplitude paroxysmal activity which was not characterized by typical epileptiform patterns;
2. Classical epileptiform paroxysmal elements.

RESULTS

In 26 (39%) cases EEG data did not reveal any significant pathology, 21 (31%) patients QEEG has shown the pathological changes - paroxysmal activity and in 20 (30%) cases the elements of

hypersynchronization of nonepileptic character were registered.

Visual analysis of EEG activity during functional probes and hyperventilation has revealed the tendency to paroxysmal (epileptiform and nonepileptical) activity in each nosological group. The results of spontaneous activity analysis by QEEG are the following:

All patients without exception have shown the decrease pattern of basic EEG activity. The analysis of frequency and amplitude characteristics revealed the bias of EEG basic pattern to prevalence of low amplitude bands activity in the patients with neurotic tics - 28%, functional tics - 21%, residual-organic tics - 24%, rheumatic tics - 10% and generalized tics - 14%.

In the group of patients with neurotic tics the maximum peak was registered on the mean -and high amplitude waves of 1,9Hz. At this time the high frequent spectrum didn't exceed 8,4Hz..

The QEEG records of patients with functional tics showed the decreased activity in the low frequent bands up to 2,4Hz and the high frequent spectrum didn't exceed 9,6Hz.

The results of QEEG analysis of patients with residual-organic tics revealed that the level of CNS dysfunction in this group was observed more obviously then in other nosological groups. For them was characterized increased theta activity with accentuation of monomorphyc waves in the parietal regions.

In the patients with rheumatic tics pathological patterns on EEG was registered mainly in the active phase of disease and it carried relatively rigid character. The main pathological changes were presented in the low frequency diapason of EEG amplitude spectrum.

The characteristics of basic EEG in the patients with Tourette Syndrome practically didn't differ from the rest of patients with various types of tics. By the investigation of

intensity of interhemispheric relations cross-correlation coefficient was defined. In the central regions of one of the hemisphere the moderate increase of cross-correlation coefficient was observed. The measurement interhemispheric correlations by the coherence

In several cases revealed in one of the hemisphere the increased the mean level of delta band coherence.

Obtained electrophysiological findings gave us the possibility to make some changes in the scheme of the treatment of patients with various types of tic disorders. The children with coexistence epileptic syndrome and tic disorders responded to anticonvulsive therapy (sodium valproat) effectively. These positive effects concerned not only to seizures but tic disorders also. After finishing the chemotherapy for tic disorders only sodium valproat gave the improvement of clinical picture and course of disease. Having taking into consideration the above mentioned fact, 42 patients with various types of tic disorders who revealed EEG abnormalities of different qualities therapy was carried out by sodium valproat (Depakin 15-20mg/kg per day). The presented scheme of treatment gave obvious improvement in tic disorders and long remission.

CONCLUSIONS

1. Taking into consideration the pathological patterns on QEEG in the treatment of patients with various types of tic disorders (without coexistence of epileptic syndrome) the involvement of anticonvulsant (sodium valproat) is recommended.
2. To define the etiology of tics and foresee the possible variants its course represents the basis of treatment optimization

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Компьютерная электроэнцефалография при тикозных гиперкинезах у детей

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Р Е З Ю М Е

Среди пограничных нервно-психических расстройств у детей значительный удельный вес занимают тики. Несмотря на многочисленные исследования, заболевание представляет одну из актуальных проблем современной педиатрии и неврологии. Целью исследования являлась оценка роли КЭЭГ у детей с тиками для определения этиологии и патогенеза тиков и выбора адекватной терапии. Обследовано 67 больных с тикозными гиперкинезами в возрасте от 4 до 15 лет и проведены клинко-энцефалографические сопоставления. КЭЭГ обследование больных проводилось с помощью аппарата Brain Surveyor фирмы "SAICO". Установлена обоснованность применения ЭЭГ для дифференциации клинических форм тиков и выбора оптимальной терапии.

КЛЮЧЕВЫЕ СЛОВА: *тикозные гиперкинезы, компьютерная электроэнцефалография, brain mapping*