Analysis on the Clinical Value of Electroencephalogram in Diagnosis of Epilepsy

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Abstract: **Objective:** To study the clinical value of electroencephalogram (EEG) in the diagnosis of epilepsy. **Methods:** 80 patients with epilepsy in the Fifth Affiliated Hospital of Sun Yat-sen University from January to December 2019 were taken as research objects. EEG was applied to diagnose and analyze the electrical activity of these patients, results of which were compared with that of clinical diagnosis. **Results:** According to the statistics, the number of patients with epilepsy diagnosed by clinical manifestations and EEG was 78 and 75 respectively. The accuracy of EEG was calculated to be 96.2%. There was no significant difference between the diagnostic results of these two methods, and the results didn't reach statistical significance ($p > 0.05$). **Conclusion:** EEG has high accuracy in detecting and diagnosing epilepsy in clinic, which is worth promoting.

Keywords: Electroencephalogram; Epilepsy; Clinical Diagnosis; Clinical Value

Relevant research data show that there are a large number of epilepsy patients in China at present. Epilepsy is a common disease with uncoordinated brain function in clinic, which is of great harm and of a high rate of disability and fatality. Moreover, there is a high possibility of family inheritance. Therefore, patients should seek medical treatment in time once they are diagnosed with epilepsy. It is usually recognized as a chronic disease in clinical practice, because the abnormal electrical activity in epileptic patients is short-lived, and the seizures are also transient. However, as epilepsy is a recurrent disease, patients should insist on medication in their daily life. Epilepsy can be divided into tonic spasm and local seizure. At present, EEG has been widely applied in clinical diagnosis of epilepsy. EEG diagnosis refers to the application of related measuring instruments to measure and record the biological potential emitted by the patient's upper brain through the scalp, and relevant graphics are drawn for clinicians and examiners to diagnose and treat the patient[1]. In this study, 80 patients with epilepsy admitted to the Fifth Affiliated Hospital of Sun Yat-sen University from January to December 2019 were taken as the research objects. EEG was applied to diagnose and analyze the electrical activity of these patients, results of which were compared with that of clinical diagnosis, indicating that there is a good diagnostic effect of EEG on epilepsy. The results are reported as follows.

1. Clinical materials

1.1 General information

The research objects were suspected epileptic patients admitted to the Fifth Affiliated Hospital of Sun Yat-sen University from January to December 2019, and

they were all diagnosed with epilepsy according to their family history of the disease and CT technology. The total number of patients was 80, including 38 males and 42 females with the average age of 42.6 ± 7.75 years old, ranging from 20 to 70 years old. Among the 80 patients with suspected epilepsy, 78 patients were clinically diagnosed with epilepsy, including 43 with comprehensive epilepsy and 35 with partial epilepsy[2].

1.2 Research methods

The EEG device of Shenzhen Elica Medical Equipment Co., Ltd. was used in this experiment. The installation of electrical level of EEG on scalp is in accordance with the international standard of 10/20, setting the filter at 30 Hz and the time constant as 0.3 seconds. The average lead and bipolar lead are adapted to measure and record the patient's electrical activity. Specifically speaking, when the patient is in a relatively quiet and stable state, the average lead is adopted to measure the electrical activity; otherwise the bipolar lead is adopted. Usually, 30 minutes is needed for EGG to detect each patient and record the results.

1.3 Diagnostic criteria

The EEG's results of patients are usually divided into four diagnostic types in clinical diagnosis, namely normal electrical activity, mildly electrical activity, moderately abnormal electrical activity and severely abnormal electrical activity. Mildly abnormal electrical activity clinically refers to those who displayed to be irregular and unstable in EGG. There's no longer eye-opening inhibitory response in patients with mildly abnormal electrical activity, and every distribution area of the brain of such patients has to varying degrees increased the activity of β and θ waves. According to the detection of EEG, the amplitude of α wave in patients' brains is of less frequency than that in normal brains, or it even disappears, which are called moderately abnormal electrical activity. The rhythm and frequency of electrical activity in these epileptic patients are mainly characterized by diffuse θ activity. Severely abnormal electrical activity detected by EEG mainly shows diffuse or paroxysmal sharp wave activity and δ activity.

1.4 Statistical analysis

SPSS20.0 software was applied to analyze the data, and $\bar{x} \pm (s)$ refers to the measurement data and is calculated and analyzed; % is the counting ratio of the data, and $P < 0.05$ was statistically significant.

2. Results

2.1 Analysis of EEG results

Conclusion can be drawn by summarizing and analyzing the test results that among the 78 patients with epilepsy diagnosed by clinical manifestations, and there are 75 patients diagnosed with epilepsy by EEG with an accuracy rate of 96.2%. These epileptic patients consist of 40 cases with mildly abnormal electrical activity, 25 cases with moderately abnormal electrical activity and 10 cases with severely abnormal electrical activity. The results are shown in the following table.

Type of abnormality	The number of patients	Proportion
Mild abnormality	40	53.3%
Moderate abnormality	25	33.3%
Severe abnormality	10	13.4%

2.2 Accuracy comparison

In the experiment, there were 78 cases diagnosed with epilepsy by clinical manifestation, and 75 cases diagnosed by EEG. That is to say, there were 3 cases misdiagnosed with a misdiagnosis rate of 3.84%. The accuracy rate of EEG was 96.16%. It can be seen that there was no significant difference between clinical manifestation diagnosis and EEG diagnosis (p > 0.05), as shown in the following table.

Method	Total number of cases	Number of confirmed cases	Accuracy rate	Number of misdiagnosis cases	Misdiagnosis rate
EEG	80	75	96.16%	3	3.84%
Clinical manifestation	80	78	100%	0	0
P value					>0.05

3. Discussion

At present, the clinical diagnosis and treatment of epilepsy still relies mainly on clinical pathology and clinical manifestations. The main symptoms of epilepsy when it occurs include temporarily losing consciousness and inability to speak clearly and fluently. Patients may also foam at their mouth in serious cases. Besides, they may suffer from strengthening in muscle relaxation of their limbs, and holding their fists tightly along with constant convulsions of their limbs. As bodily function will be out of the control of the brain, incontinence occurs[3]. Apart from observing the clinical manifestations of patients to diagnose epilepsy, clinicians will also apply some applicable clinical auxiliary examinations, such as EEG device that is the commonly used. The EEG device is used for 24 hours to detect the electrical activity in the upper brain of patients, and the corresponding electrical activity maps are drawn by computers, through which clinicians can judge whether a patient suffers from epilepsy, and they analyze and diagnose the severity of the disease to treat the patient symptomatically according to the test results[4]. Although there are many other technologies and methods that can be used for auxiliary diagnosis of epilepsy in clinic, EEG is the most outstanding method and it can not be replaced by other auxiliary diagnosis technologies at present. EEG can analyze and judge the root cause of epilepsy from small changes of the electrical activity in brains of patients. Moreover, the positive results of EEG detection of epilepsy are higher. That is why EEG is mainly used for auxiliary diagnosis and analysis of patients in clinic. However, when EEG is used for auxiliary diagnosis of epilepsy, there will be a small probability of error. Studies have shown that about 5% of misdiagnosis will occur in EEG detection.

By summarizing and analyzing the results of this experiment, it can be concluded that among the 78 patients diagnosed with epilepsy by clinical manifestations, there are 75 are diagnosed with epilepsy by EEG. There are 40 patients with mild, 25 patients with moderate and 10 patients with severe abnormality of electrical activity, respectively. It can be obtained that the accuracy of EEG diagnosis is 96.16%, and the error rate is 3.84%. After comparing and analyzing the diagnosis results of the two methods, there is no significant difference, and the results are not statistically significant (p > 0.05). To sum up, EEG diagnosis has a high accuracy rate in clinic, which is of great help for clinical diagnosis of epilepsy, and it is worth popularizing and applying[5].

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