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Clinical Analysis in Chronic Alcoholic Encephalopathy: A Retrospective Study of 43 Subjects

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Abstract

Background and purpose: Chronic alcoholic encephalopathy (CAE) refers to the effects of chronic alcohol consumption on cerebral structure and function in human. The diagnosis is frequently missed for its atypical clinical presentation. Here, we performed this retrospective study to analyze clinical manifestations, neuroimaging findings and electroencephalography (EEG) alterations in CAE patients, with the aim to highlight the importance of recognition or diagnosis of CAE.

Patients and methods: We analyzed the clinical manifestations, neuroimaging findings and EEG alterations of 43 patients (42 males and 1 female) with CAE diagnosed in Sun-Yat Sen Memory Hospital, Guangzhou from 1998 to 2013.

Results: Mental impairment (25.58%), limbs tremor (25.58%), and dizziness (25.58%) were the most frequent clinical manifestations. Other less common presentations including memory impairment (16.28%), ataxia (13.95%), dysarthria (13.95%), consciousness disturbance (11.63%), epileptic seizure (11.63%), ocular motor dysfunction (0.11%), dementia (0.11%), and headache (0.05%) were also observed. Neuroimaging findings showed brain atrophy, ischemia, and demyelinated changes. Among 14 patients who undertwent EEG examination, diffuse slow wave or theta rhythm (3-4 Hz, 10-40 uV) was found in 10 patients. Most patients with CAE showed good response to abstinence and vitamin B supplement.

Conclusion: For the alcoholic patients, detailed medical history and close follow-up with MRI scan and EEG are valuable tools to detect CAE. Abstinence combined with vitamin B supplement usually obtain a gratifying clinical improvement.

Keywords Alcoholic encephalopathy; Manifestation; Magnetic resonance imaging; Electroencephalography

Introduction

Alcoholism is an addictve disorder due to excessive consumption of alcohol. Frequent concomitants of alcoholism are liver disease, including hepatitis, steatosis and cirrhosis [1]. Chronic alcoholic encephalopathy (CAE) refers to the effects of chronic alcohol consumption on cerebral structure and function in human. The extent of injury to the brain and effects of alcohol abuse vary from person to person. CAE is associated with several risk factors, such as direct toxicity of alcohol, malnutrition, thiamine deficiency and family history of alcoholism [2].

Alcoholic encephalopathy covers a wide range of alcohol related intellectual and neurological syndrome, including Wernicke's encephalopathy (WE), Korsakoff's syndrome (KS), alcohol demetia, and other disorders affecting many structures in the brain [3]. WE is an acute neuropsychiatric syndrome associated with thiamine deficiency due to chronic alcoholism [3]. This disorder is characterized by a classical clinical triad of ocular motor dysfunction, ataxia (cerebellar dysfunction), and mental impairment [4]. However, the classical presentation of the syndrome is rare. Incidence rates of WE in patients with alcoholism can be as high as 12.5%, but noly 0.1-2.8% in general population [5]. KS, developed from undiagnosed and untreated WE, is a typically permanent neurological disorder characterized by anterograde amnesia [6].

Though chronic alcoholic encephalopathy is an effectivelly preventable and treatable disease, we often missed the diagnosis in daily medical practice for its atypical clinical manifestations. Hence, we carried out this retrospective study to analyze clinical manifestations, neuroimaging findings and electroencephalography (EEG) alterations, with the aim to highlight the importance of recognition, diagnosis and management of CAE (Table 1).

Methods

This retrospective study was approved by the Ethical committee of the Sun Yat-Sen Memory Hospitan, Sun Yat-Sen University. The study comprised 43 CAE patients, who were admitted to Sun-Yat Sen Memory Hospital of Sun-Yat Sen University between 1998 and 2013. We excluded patients with acute alcoholism or peripheral neuropathy due to chronic alcoholism. Diagnosis of CAE was based on the patient's detailed history, clinical presentation, neuroimaging and EEG alterations. After identification of patients, clinical and neuroimaging features, EEG alterations and treatment were collected. All diagnosed patients were educated to quit alcohol and treated with vitamin B.

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Results

Individual characteristics

The study consisted of 42 males and 1 female with the age rangeing from 29 to 73 years. Thirty one patients had received MRI/CT examination, and 14 patients underwent EEG examination. Abdominal color Doppler ultrasound was performed in 15 patients.

Clinical characteristics

Various clinical manifestations were found in patients with CAE, which were summarized in Figure 1. Mental impairment (25.58%), limbs tremor (25.58%), and dizziness (25.58%) were the most frequent clinical manifestations. Other less common presentations including memory impairment (16.28%), ataxia (13.95%), dysarthria (13.95%), consciousness disturbance (11.63%), epileptic seizure (11.63%), ocular motor dysfunction (0.11%), dementia (0.11%), and headache (0.05%) were also observed. Fifteen patients underwent abdominal color Doppler ultrasound examination, and hepatic steatosis were found in 12 cases.

Clinical signs	Number of patients	No (%)
Ocular motor dysfunction	2	0.11
Ataxia	6	13.95
Mental impairments	11	25.58
Dementia	2	0.11
Memory impairment	7	16.28
Consciousness disturbance	5	11.63
Limbs tremor	11	25.58
Epileptic seizure	5	11.63
Dysarthria	6	13.95
Dizzy	11	25.58
Headache	1	0.05

Table 1: Clinical signs of the CAE in 43 diagnosed cases.

Neuroimaging features

Nine cases of the 43 CAE patients received brain CT examination. Ischemic lesions in white matter were observed in four patients, as well as brain atrophy in one patient. As CT is not sensitive to the early change of brain, especially demyelinated change, so we mainly focus on MRI findings. Twenty two patients underwent MRI examination. Eleven patients showed ischemic lesions on corpus callosum, fornices, and frontal-parietal cortex. Cortical volume deficits and expanded ventricle were found in nine patients (Figure 2). Three patients showed remarkable demyelinated changes (Figure 3). Hypointensity on T1-weighted images (T1WI), and hyperintensity on T2-weighted images (T2WI) and fluid-attenuated inversion recovery (FLAIR) images were found in bilateral basal ganglia, insular lobes, right-side frontal lobe and temporal lobe.

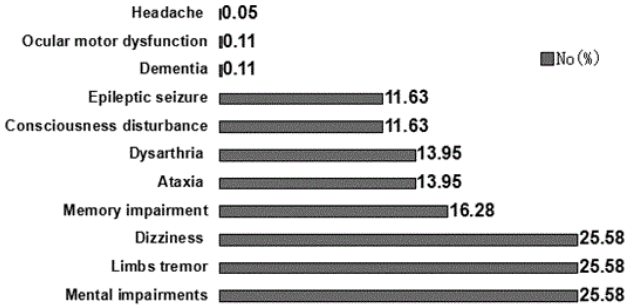

Figure 1: Clinical manifestations in 43 cases with CAE (chronic alcoholic encephalopathy).

EEG

EEG were performed in 14 cases. Abnormal EEG record were found in ten patients, including diffuse slow wave and theta rhythm (3-4Hz, 10-40uV) in the background rhythm of EEG (Figure 4).

Treatment

All cases accepted abstinence and vitamin B supplement. Patients were divided into four categories according to the curative effects. The main symptoms and signs disappeared by more than 85%, 60%, and 30%, were respectively classified as cure, marked improvement and slight improvement. No improvement was considered when the disappeared symptoms and signs were less than 30%. Among the outcome of the 43 CAE patients, 23.26% patients had been totally cured, 25.58% clinical manifestations had been markedly improved, 41.86% had been only slightly improved, and 9.30% of the cases had no improvements.

Discussion

Alcohol can cause a spectrum of structural and functional change in the brain, including shrinkage and sometimes permanent death cells. The brain structures most vulnerable to the effects of alcoholism are neocortex, limbic system, and the cerebellum [7]. The molecular basis is still not clear. Peng Ying found decreased expression of several neural genes (xPax6, xOtx2, xSox3, xSox2, and xNCAM) in alcohol-induced microcephaly [8]. In addition, alcohol could interfere with the thiamine absorption, which may contribute to the acute neurological disorder WE. WE may lead to Kosakoff's syndrome (KS), a severe neurological disorder characterized by anterograde amnesia [9]. As clinical manifestations are often atypical, the neuroimaging and electrophysiology play an important role in the detection of CAE. Hence, we analyzed the characteristics of CAE with the aim to improve the diagnosis and management of this disease.

The present study showed variability in clinical features of CAE. The most frequent clinical manifestations in patients with CAE were mental impairment, limbs tremor, and dizziness. However, mental impairment was rarely observed in Pitel's study [10], and ataxia of gait was more common in Damsgaard's study [11]. Patients with mental impairment were usually misdiagnosed as psychosis. Thus, clinicians should attach more importance to detailed history of alcoholism and some assistant examination. Most studies were focused on WE [11-14], however, not all patients with WE have classical triad

syndrome. Similarly, not all KS patients exhibit permanent amnesia [15]. When the presentations limited clinical assessment, the diagnosis can be made from the history, CT/MRI findings, EEG, as well as a good response to thiamine supplement.

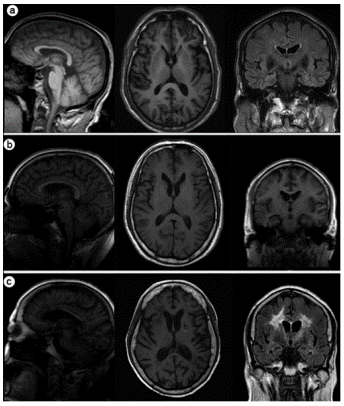

Figure 2: Brain-volume deficits in alcoholism and its sequelae. Sagital (left column), axial (middle column) and coronal (right column) brain T1-weighted MRI are shown. (a) a 65-year-old healthy control male, (b) a 64-year-old man with alcoholism, and c. a 50-year-old man with alcoholism. Enlargement of the ventricles (b, c) can be observed compared with the healthy control (a), which indicating shrinkage of the surrounding tissue. Leukoaralosis around the ventricles can be observed in picture c The abnormal signal around the ventricles (c) was leukoaralosis.

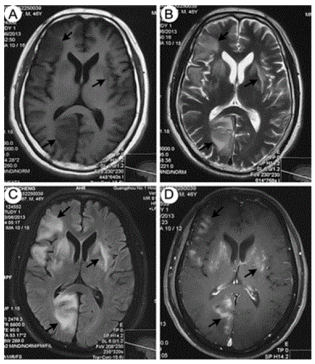

Figure 3: Demyelinated changes and its sequelae in a 50-year-old man with alcoholism. Hypointensity (arrow) on T1-weighted images (A), and hyperintensity (arrow) on T2-weighted images (B), fluid-attenuated inversion recovery (C) images, and post-contrast T1 (D) can be observed in bilateral basal ganglia, insular lobes, right-side frontal lobe and temporal lobe.

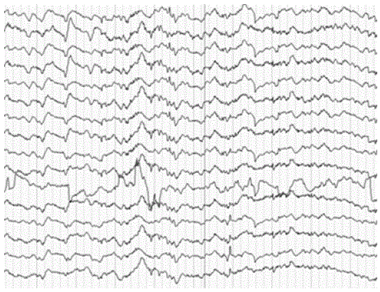

Figure 4: Abnormal EEG record in a 70-year-old with CAE. Theta rhythm (3-4 Hz, 10-40 uV) can be observed in EEG record.

Abstinence and vitamin B supplement are the key to the treatment. It can be explained by the fact that alcohol related brain damage is partialy reversible [9]. Most patients were good respond to treatment with abstinence and vitamin B. About 23% of the 43 patients obtained well recovery, and 90% received mild to moderate improvement in our study. In addition, eliminating the oxide and free radicals also exert valuable role in CAE. Because metabolites induced by ethanol can lead to oxidative damage [16,17]. Reports showed that oxidative and nitrosative stresses can contribute to alcohol-induced fetal ocular injury [18-20].

The CT and MRI have enabled more detailed insights into brain structure and function. The European Federation National Societies (EFNS) recommend MRI to support the diagnosis of WE in the published Guidelines for diagnosis, therapy and prevention of WE [21]. In our study, hypointensity on T1WI, and hyperintensity on T2WI, FLAIR images, and post-contrast T1 were observed in some cases (Figure 3). Cortical volume deficits and expanded ventricle were found in nine patients (Figure 2). These findings were consistent with the early studies [22,23]. Chronic alcohol abuse causes gross morphological change and result in individual differences in gray matter density or volume [24]. This is probably due to that gray matter is more heavily vascularied than white matter in brain [25]. Furthermore, eleven patients' MRI showed ischemic lesions in bilateral basal ganglia, insular lobes, right-side frontal lobe and temporal lobe. Because excessive alcohol might lead to stroke via reduction of cerebral blood flow and induction of cardiac arrthythmias and cerebral embolism [26].

EEG provides a noninvasive measure of brain function by recording the electrical signals from the brain. Report showed that the EEG record is different in alcoholics and nonalcoholics [27]. Fourteen cases underwent EEG examination in this study. Diffuse slow wave or theta rhythm (3-4 Hz, 10-40 uV) was found in 10 patients (Figure 4). These abnormalities were consistent with Rangaswamy's study [26], which implied decreased cognitive activity and the imbalance of excitatory and inhibitory neurons in the cortex [27]. Therefore, EEG is a valuable assistant examination to support the diagnosis of CAE.

Limitations of the study

The main limitation of our study is its retrospective design and the data have been collected during a 15-year period. In addition, some patients with CAE may not have been identified due to the absence of predefined criteria and atypical clinical characteristics. However, in spite of this limitation, we have still collected enough information to

allow meaningful analysis of the clinical characteristics with CAE patients.

Conclusion

CAE are life-threatening conditions with atypical neurological presentation. The clinical diagnosis of CAE and even WE can be difficult to make, and many cases of this conditions have been missed. As shown in this paper, the most common clinical manifestations in patients with CAE were mental impairments, limbs tremor, and dizziness. These clinical signs are abnormal in some other central nervous systemic disease and even other systemic disorders. Therefore, clinicians must maintain a high index of suspicion in order to make the early diagnosis of CAE, and large dose of vitamin B should be given. Furthermore, MRI and EEG are valuable tools for the diagnosis. Patients with CAE were usually finely responsed to treatment with abstinence and vitamin B supplementation. In addition, public education program should be recommended to help alcoholic individuals to recognize that components of the structural and functional changes associated with alcoholism are partially reversible after several weeks of abstinence [27].

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