Clinical Case Report

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Occipital epilepsy versus progressive myoclonic epilepsy in a patient with continuous occipital spikes and photosensitivity in electroencephalogram

A case report

Yudan Lv, MD[a], Nan Zhang, MS[a,b], Chang Liu, MS[a], Mingchao Shi, MD[a], Li Sun, MD[a,*]

Abstract

Introduction: Progressive myoclonic epilepsy (PME) is rare epilepsy syndrome. Although EEG is a useful neurophysiological technique in the evaluation of epilepsy, few EEG abnormalities have been described in PME. So, how to use EEG hints to establish the suspected diagnosis of PME as soon as possible should be addressed.

Case present: We presented a case with refractory myoclonic seizures, and progressive neurological deterioration, diagnosed as PME and neuronal ceroid lipofuscinosis disease by gene testing. The patient manifested with a significant regression in her speech ability and motor balance. The mini-mental state examination showed poor scores of 15/30. The magnetic resonance imaging showed diffused atrophy. Her EEG showed slow background with continuous occipital small spikes and photosensitivity. The following genetic testing with mutation in *CLN6* confirmed the diagnosis and excluded the occipital epilepsy.

Conclusion: Our case showed rare manifestations and special EEG features of PME, which may be confused with occipital epilepsy or photosensitive epilepsy. Thus, if the continuous occipital spikes and photosensitivity were presented in a patient with refractory seizures and developmental regression, PME should be considered.

Abbreviations: LEV = levetiracetam, LINCL = late infantile, NCL = neuronal ceroid lipofuscinosis, PME = progressive myoclonic epilepsy.

Keywords: EEG, neuronal ceroid lipofuscinosis, occipital spike, photosensitivity, progressive myoclonic epilepsy

1. Introduction

Progressive myoclonic epilepsies (PMEs) are rare disorders caused by metabolic, genetic, and neurodegenerative diseases, which have been defined as severe conditions characterized by refractory epilepsy, neurological deterioration, and cognitive impairment with a poor prognosis.[1] PME can present with multiple seizure types, worsening myoclonus, and developmental regression. A wide range of specific etiology contributes to the PME, such as Tay-Sachs, myoclonic epilepsy with ragged red fibers, *POLG1* mutation, Lafora disease, Unverricht-Lundborg disease, neuronal ceroid lipofuscinosis (NCLs), and so on. Long-term prognosis and the mortality depend on the specific etiology.

The NCLs is a group of inherited lysosomal storage diseases that together constitute the neurodegenerative disorders of childhood. They are clinically and genetically heterogeneous and are characterized by accumulation of autofluorescent material in cells, neurodegeneration, and blindness.[2,3] Historically, 4 major NCLs subtypes (infantile NCLs, late-infantile NCLs, juvenile NCLs, and adult NCLs) have been classified on the onset age and the abnormal storage material.[4] Among the NCLs, late infantile (LINCL) and juvenile are the most common forms. Current genetic techniques with DNA sample collected from blood can help the physician to make an accurate diagnosis and counsel the patients and families more quickly and effectively.

The EEG has been considered as a useful neurophysiological technique in the evaluation of epilepsy so far. As we known, the existence of occipital spikes and photosensitivity in EEG are very common to see in occipital epilepsy or photosensitive epilepsy. Nevertheless, such EEG abnormal changes have rarely been described in other epilepsy types such as PME. So, how to help clinical doctors use EEG hints to establish the suspected diagnosis of PME as soon as possible should be addressed. In addition, in this case, we reported a special case of LINCL as one form of the most fatal PME, to present some special EEG characteristics in details. The written informed consent has been obtained from the patient's family members and this case report has been approved by the First Hospital of Jilin University's Research Ethics Board.

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[a] Department of Neurology and Neuroscience Center, The First Hospital of JiLin University, Changchun, [b] Department of Neurology, Yidu Central Hospital, Weifang, Shandong, China.

[*] Correspondence: Li Sun, Department of Neurology and Neuroscience Center, The First Hospital of JiLin University, 71-Xinmin St, Changchun, P. R. China (e-mail: sjnksunli@163.com).

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2. Case report

A female patient, 21 years old, presented with refractory epilepsy seizures for 7 years and aggravated for 3 years. When she was 14 years old, she has a tonic-clonic seizure with frequency of 3 to 4 times per year. And 2 years later, she manifested with another new attack of myoclonic seizure, which can be induced by voice, light, and startle. When she was 18 years old, the frequency of all seizures described above increased significantly to dozens a day. At the same time, significant developmental regression has been found, such as serious language problems, difficulties in balance, and walking. Because of her poor developmental condition, she insists on completing the education of junior high school, but with poor performance in school. Then she has dropped-out at 16 years. Her mother described that in her babyhood, she was normal. When the little girl was 4 to 5 months old, she could pick up the objects, and she could sit safely without support around 8 to 9 months. She could walk and run unstably around 10 to 11 months. Her first words of "ma, ma" were heard around 10 months, simple words of "good, no, eat" were heard around 14 months. Such normal development persisted until 18 years old. After admission, she was found to be afraid of voice and light worsely, and her seizures developed into status epilepticus. Neurology examination showed significant muscle atrophy of lower limbs, muscle strength 4, and ataxia. Minimental state examination was performed to test her cognitive function. And her poor score of 15/30 revealed that she had a big trouble in language and memory. However, she could not cooperate with the tester in comprehensive neuropsychological tests such as the Chinese Revised Wechsler Adult Intelligence Scale and the Chinese Revised Wechsler Memory Scale. In the following steps, EEG and magnetic resonance imaging (MRI) were performed. Her MRI showed diffused atrophy in cerebral cortex, especially in frontal lobe and parietal lobe (Fig. 1). Her interictal EEG showed slow activity in background with continuous spike in occipital lobe (Fig. 2). And ictal EEG showed generalized polyspike and spike-slow complex wave, which was synchronized to the tonic-clonic seizure (Fig. 3). In addition, during the process of light stimulation, sensitive photosensitivity occurred frequently. From her EEG changes, we have found some helpful hints: continuous spike indicated hyperreactivity in occipital lobe, and occipital epilepsy may be considered firstly. However, generalized polyspike and spike-slow complex discharges were rarely found in this epilepsy form. Slow background with generalized polyspike and spike-slow complex discharges indicated severe epileptic syndrome or epileptic encephalopathy. Then we reviewed her clinical history of developmental regression and frequent myoclonic seizure again, and made a suspected diagnosis of PME. Photosensitivity in EEG combined with the voice-sensitive or light-sensitive seizure onset was also helpful in the diagnosis of PME.

Under this situation, the gene screening was suggested, and the following result showed mutation in *CLN6*, which contributed to the diagnosis of LINCL. After the confirmation of diagnosis, we gave the treatment of valproate and levetiracetam (LEV) to control the seizure. The therapy to PME is administrated as valproate 1.5 g/day and LEV 2.0 g/day for 2 months. The frequency of tonic-clonic seizure decreased significantly from dozens/day to 2 to 3 times/day, and the myoclonic seizure decreased not significantly to 10 to 15 times/day, but can resist to the light and voice to some extent. However, the female patient has a poor prognosis. In the following visit, she has serious sleep problems, such as sleep fragment and insomnia due to her sensitivity to the light and voice. In addition, the muscle atrophy was progressive, and she developed a severe pneumonia due to long-term bed rest. After obtaining the gene results of *CLN6* mutation, we suggested the visual and retinal assessment with

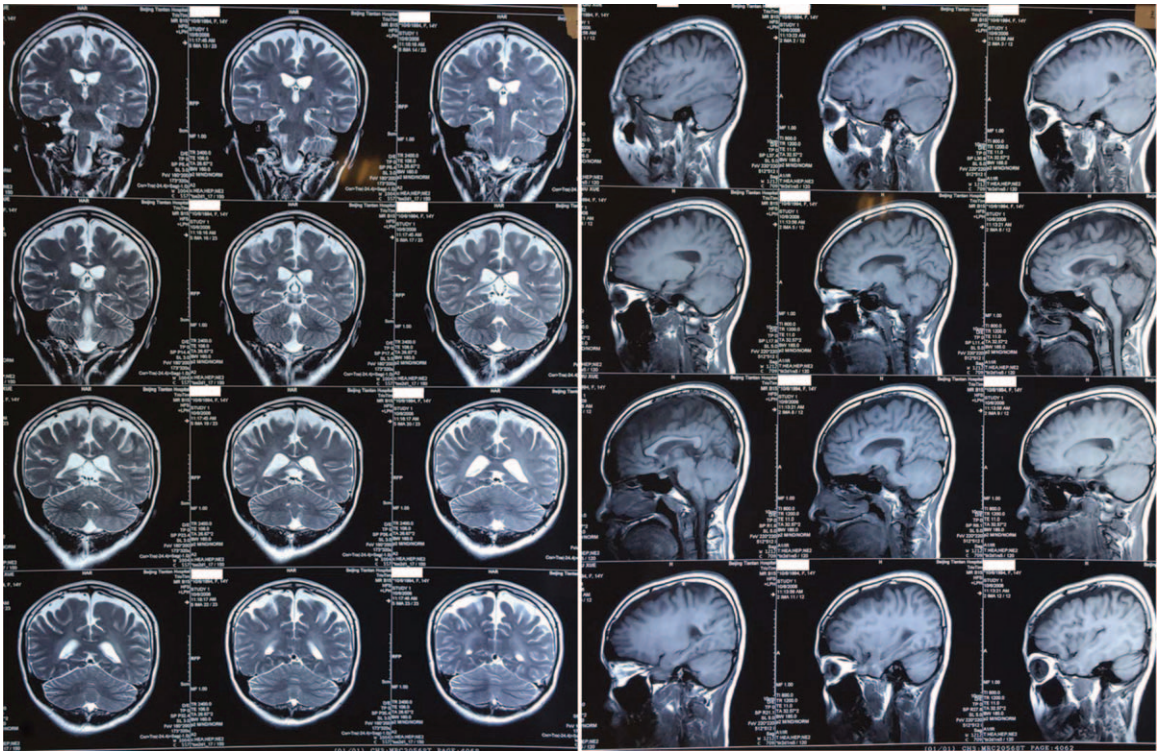

Figure 1. Diffused atrophy in cerebral cortex in magnetic resonance imaging (MRI).

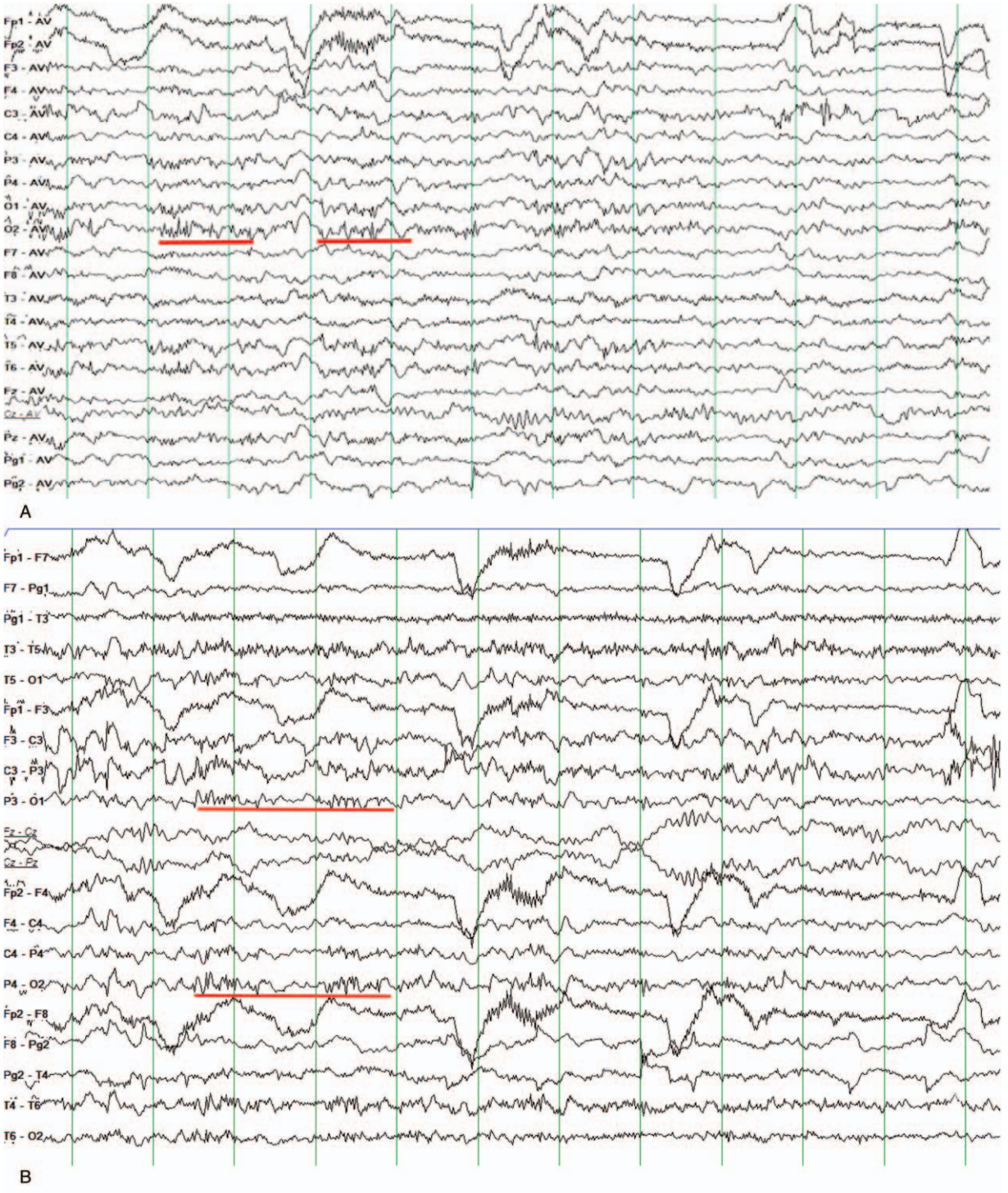

Figure 2. Slow activity in background with continuous spike or spike-slow wave in occipital lobe (A); continuous spike or spike-slow wave presented in bipolar montage (B).

ophthalmological evaluation or visual-evoked potential to the patient. However, the patients' mother refused due to her daughter's poor status.

3. Discussion

We reported a girl diagnosed as PME syndrome and found special EEG manifestations of slow background with continuous spike in occipital lobe, rare generalized polyspike, spike-slow complex discharges, and photosensitivity. As we known, the special EEG features described above is rather suggestive of occipital epilepsy or photosensitive epilepsy, which may cause diagnostic confusion when they occur in other disorders, such as PME presented in our case.

PME is a complex epilepsy syndrome described as progressive cognitive impairment, ataxia, and refractory myoclonus. It often

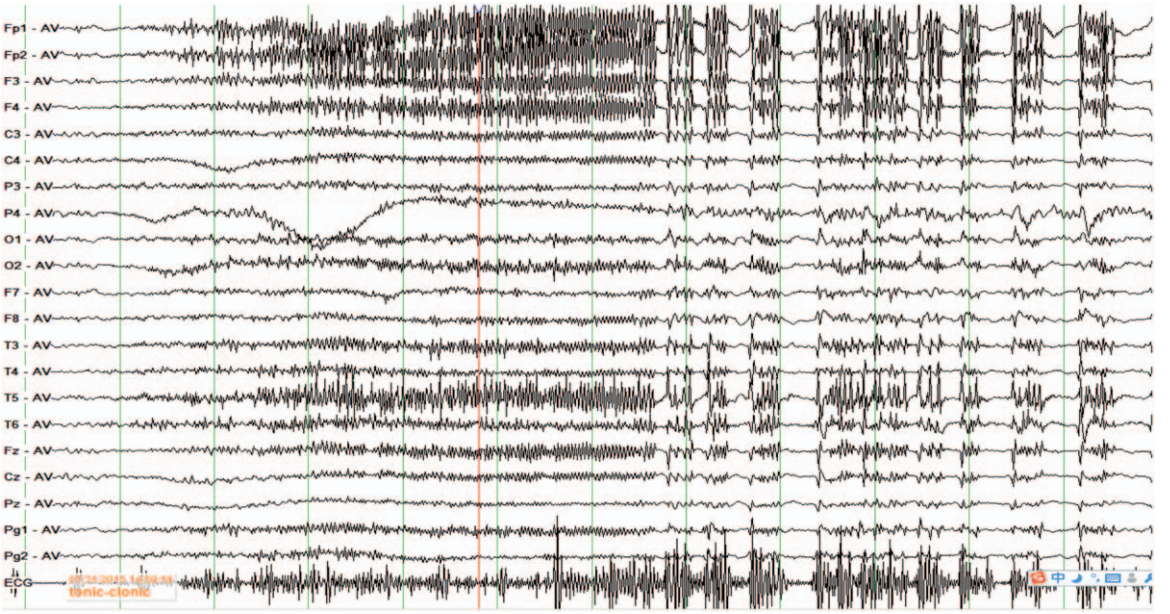

Figure 3. Generalized polyspike and spike-slow complex wave synchronized to the tonic-clonic seizure in ictal EEG.

causes diagnostic problems due to its extensive diagnostic entities. Recently, PMEs have been recognized as a group of syndromes with specific etiologies. However, few studies demonstrated the EEG changes in PME in details. Girard showed slowing background with frequent generalized and multifocal epileptiform discharges in PME.[5] De Siqueira[6] found that photosensitivity with frequent interictal and ictal discharges could be seen in PME. Isobe et al[7] reported periodic epileptiform discharges in advanced stages of PME in children. Such patterns have been described in our case, and other characteristics of continuous occipital spikes with generalized tonic-clonic discharges have also been presented in our case.

In addition, NCLs represents one common form of PME. Among most NCLs, a progressive visual failure is a core feature and the continuous occipital spikes associated with photosensitivity in EEG may predict the visual failure. The therapy to seizures in NCLs has been considered as a challenge. Multiple AED drugs including valproate, clonazepam, lamotrigine, and topiramate have been tried with variable response, but with no stable and long-term effect in patients with NCLs.[8] Some studies reported that NCLs patients might show a rapid response to LEV, which need further observation.

However, posterior discharges of spike or spike-slow were common to see in occipital epilepsy, but persistent low-amplitude poly-spike discharges were not usual morphology. Such EEG changes described in our case may offer useful clues to clinicians and help to narrow the differential diagnosis. In addition, partial seizures rather than generalized seizures (generalized tonic-clonic or myoclonic) were commonly presented in the occipital epilepsy. And developmental regression and diffused atrophy in cerebral cortex were rarely seen in occipital epilepsy. So, in our case, PME has been diagnosed, and occipital epilepsy has been excluded.

Thus, our case showed special EEG findings in PME, which may be confused with occipital epilepsy or photosensitive epilepsy. So, if the continuous occipital spikes and photosensitivity are presented in a patient with refractory seizures and developmental regression, it may suggest different neurological diseases, but, PME also needs to be considered. Such EEG changes may provide diagnostic clues.

Author contributions

Conceptualization: M. Shi.
Data curation: C. Liu.
Project administration: L. Sun.
Software: M. Shi.
Supervision: L. Sun.
Validation: L. Sun.
Writing – original draft: Y. Lv.
Writing – review & editing: N. Zhang.

References

[1] Nita DA, Mole SE, Minassian BA. Neuronal ceroid lipofuscinoses. Epileptic Disord 2016;18:73–88.
[2] Goebel HH, Braak H, Seidel D, et al. Morphologic studies on adult neuronal-ceroid lipofuscinosis (NCL). Clin Neuropathol 1982;1:151–62.
[3] Goebel HH. The neuronal ceroid-lipofuscinoses. Semin Pediatr Neurol 1996;3:270–8.
[4] Nijssen PC, Ceuterick C, Van Diggelen OP, et al. Autosomal dominant adult neuronal ceroid lipofuscinosis: a novel form of NCL with granular osmiophilic deposits without palmitoyl protein thioesterase 1 deficiency. Brain Pathol 2003;13:574–81.
[5] Malek N, Stewart W, Greene J. The progressive myoclonic epilepsies. Pract Neurol 2015;15:164–71.
[6] De Siqueira LF. Progressive myoclonic epilepsies: review of clinical, molecular and therapeutic aspects. J Neurol 2010;257:1612–9.
[7] Isobe N, Sakai Y, Kira R, et al. Periodic epileptiform discharges in children with advanced stages of progressive myoclonic epilepsy. Clin EEG Neurosci 2016;47:317–23.
[8] Crest C, Dupont S, Leguern E, et al. Levetiracetam in progressive myoclonic epilepsy: an exploratory study in 9 patients. Neurology 2004;62:640–3.