Generalized Periodic Epileptiform Discharges in a Case of Viral Encephalitis with a Good Prognosis

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Generalized periodic epileptiform discharges (GPEDs) are a periodic electroencephalogram (EEG) pattern with bisynchronous sharp wave complexes occurring in periodic intervals between 0.5 and 4 seconds [1]. This EEG pattern has been described critically ill patients, often with metabolic or postanoxic encephalopathies, convulsive status epilepticus (SE), and progressive central nervous system diseases, including Creutzfeldt–Jacob disease (CJD) or subacute sclerosing panencephalitis (SSPE) [2]. Few studies have examined the clinical outcome of patients with GPEDs, but GPED pattern are believed to predict a grave outcome with a poor prognosis [3]. We present a case of 56-year-old man who admitted to our hospital because of viral encephalitis, he was found to have GPEDs on his EEG (Figure 1) with a good prognosis.

A 56-year-old man presented to our emergency department because of paroxysmal dizziness associated with reaction retardation, dysphonia, sweating, and abnormal behavior. Each attack lasts 3–5 min. Family members later remembered that he caught herpes zoster virus 2 months before his admission. He had a long history of smoking, with occasional alcohol use, and he denied illicit drug use, but was otherwise healthy without any particular family history or past history such as cerebrovascular disease, endocarditis, or viral hepatitis. A subsequent EEG revealed GPEDs (Figure 1).

On admission to our neurology department at the next day, he had no abnormal findings on nervous system and on physical examination. Admission laboratory data included a complete blood count revealing an elevated white blood cell count of $14.20 \times 10^9/L$ (reference range, 4–10). His various *biochemical indicators and tumor markers* were normal.

A lumbar puncture was performed. Cerebrospinal fluid (CSF) pressure was not high, and CSF *biochemical* and *conventional* examination was normal. Additional tests on the patient's CSF were

ordered, EB-VCA-IgA, TOXO-IgM, CMV-IgM produced positive results. CSF bacterial culture revealed a negative result. The patient's chest radiograph, brain computed tomography, computed tomography angiography, and magnetic resonance imaging revealed no focal abnormalities.

A diagnosis of viral encephalitis with secondary epilepsy due to EEG and CSF result was reached. He was empirically started on antibiotics (cefuroxime) in treatment of infection. We immediately administered valaciclovir by oral, with corticosteroid by intravenous injection for antiviral therapies. Treated by oral carbamazepine with intramuscular injection phenobarbital, our patient's seizures resolved at the 4th day after admission. In the second EEG test (Figure 2A), the prior GPEDs had disappeared, while the epileptiform discharges were remains. EEG recorded again at the 8th day after admission (Figure 2B), it showed the presence of only a little sharp wave remains. The day before his discharge from hospital (at the 13th day after admission), one more EEG test was taken, it showed few sharp waves (Figure 2C). One month after his discharge from hospital, with treated by carbamazepine (0.1 g/bid) only, review of EEG revealed no abnormalities (Figure 2D). The patients had no more seizures.

Generalized periodic epileptiform discharges are a rare EEG pattern composed of generalized, synchronous electrographic discharges, and earlier studies reported the incidence of GPEDs as 0.06–0.2% in adults included patients with both acute and chronic neurological disorders [4,5]. GPEDs are considered a unique EEG patterns that signify a severe, diffuse, and irreversible brain injury, occurring as an epiphenomenon in chronic neurological diseases, such as SSPE, CJD, neurosyphilis, or Lennox–Gastaut syndrome, or after an acute neurological insult caused by ischemia, hypoxia, or metabolic disturbances [5,6]. Such discharges are a characteristic but nonspecific EEG finding in cer-

Figure 1 Electroencephalogram (EEG) revealing continuous generalized polyphasic periodic epileptiform discharges. EEG demonstrates continuous generalized synchronous periodic polyspikes and sharp slow complex waves, 1 Hz with amplitude of 200–300 mV. (Sensitivity, 10 mV/mm; paper speed, 30 mm/second; high-frequency filter, 35 Hz; low-frequency filter, 1 Hz; 60 Hz filter off.)

Figure 2 Sequential changes on electroencephalogram (EEG) findings. (A) EEG shows synchronous eruptive polyspikes and sharp slow complex waves and slow- background activities. (B) EEG shows synchronous paroxysmal spike and sharp and a little slow wave of background activities. (C) EEG shows few paroxysmal sharp and normal background activities. (D) EEG reveals no abnormalities.

tain diseases besides CJD and SSPE, such as hepatic encephalopathy and anoxic encephalopathy, viral encephalitis due to herpes simplex virus, influenza virus, or canine distemper virus, and Alzheimer's disease [3,6–8], and are believed to predict a grave outcome with a poor prognosis. GPEDs were the only EEG feature related to outcome in SE and are associated with poor outcome

independent of etiology [3,9]. In our case, he was found to have GPEDs (Figure 1) on his EEG. GPEDs are generally thought to involve extensive gray matter, while in our patients were normal in imaging examinations. GPED pattern presented in our case probably due to severe neurotransmitter imbalance of the central nervous system and metabolic encephalopathy after seizures.

GPEDs associated with viral encephalitis with a good prognosis have not been previously reported. Our case is the first to report these. In our patient, GPEDs are emerged on EEG in the early stage of viral encephalitis and disappeared in 5 days after active treatment by antiepileptic drugs and ant virus. We herein report case that exhibited GPED EEG patterns in the early stage if given a timely and effective treatment will result in a good prognosis. A dynamic sequential evolution of EEG findings was observed dur-

ing the course of treatment, consisting of improvement EEG background activities, which could constitute a criterion for a good prognosis.

Conflict of Interest

The authors declare no conflict of interest.

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