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Case report

Successful ECT treatment for medically refractory nonconvulsive status epilepticus in pediatric patient

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ABSTRACT

Status epilepticus is a life threatening condition with a high mortality rate in spite of aggressive treatment. There is little consensus on third and fourth line approaches in refractory cases. While electroconvulsive therapy (ECT) has been employed successfully as a treatment for refractory epilepsy and status epilepticus (SE) after exhausting conventional therapy, its use for pediatric patients is limited. We describe a 7-year-old pediatric case in which ECT was used successfully to treat medically refractory nonconvulsive status epilepticus (NCSE) without complete withdrawal of antiepileptic drugs (AED).

1. Introduction

Status epilepticus (SE) affects 120,000–200,000 Americans per year, of which 25–50% may be considered non-convulsive SE.[1] SE is life-threatening condition, with a mortality rate of 1.9 to as high as 40%, depending on the population studied.[2] Due to its high mortality and morbidity, multiple approaches have been suggested to treat SE, including general anesthesia. However, in spite of putting patients into comatose state under general anesthesia or barbiturates, mortality rate is still high, about 20%.[3] Although definitions of refractory SE vary, it is thought to occur between 10–70% of cases.[4] Electroconvulsive therapy (ECT) has been employed successfully as a treatment for refractory epilepsy and SE after exhausting conventional therapy.[4–6] However, ECT use in pediatric patients is limited, even in psychiatric illness.[7] In a limited previous case series of ECT treatment in pediatric patients for refractory epilepsy, AED were halt during the ECT course.[6] We describe a pediatric case in which ECT was used successfully to treat medically refractory nonconvulsive status epilepticus (NCSE) while the AED were continued.

2. Case report

2.1. History

A 7-year-old female with cerebral palsy, extensive bilateral polymicrogyria throughout both hemispheres predominately involving the medial parietal lobes and lesser degree to bilateral frontal lobes and right insula/superior temporal lobe, developmental delay, and intractable epilepsy with previous treatment with ketogenic diet and phenobarbital was admitted to our Epilepsy Monitoring Unit (EMU). On the day of admission to EMU, she developed NCSE with generalized spike and waves 1–2 Hz while on valproate, levetiracetam and clobazam (Fig. 1A). Multiple intravenous loads of benzodiazepam, levetiracetam, phenobarbital did not halt her NCSE.

2.2. Medical treatment

She was transferred to the pediatric intensive care unit for further management of her NCSE on hospital day 1. Burst suppression was achieved on hospital day 2 with a combination of concomitant intravenous anesthetics, including with midazolam drip, pentobarbital drip, ketamine drip, topiramate load, and high dose steroid as well as continuation of AEDs on admission. She remained in burst suppression for the next 12 days. Electrographic seizures recurred when attempting to wean her from high dose anesthetic therapy.

Abbreviations: VPA, Valproate; LEV, Levetiracetam; CLB, Clobazam; LOR, Loarzepam; PB, Phenobarbital; MDZ, Midazolam; FEN, Fentanyl; TPM, Topiramate; PEN, Pentobarbital; KET, Ketamine.

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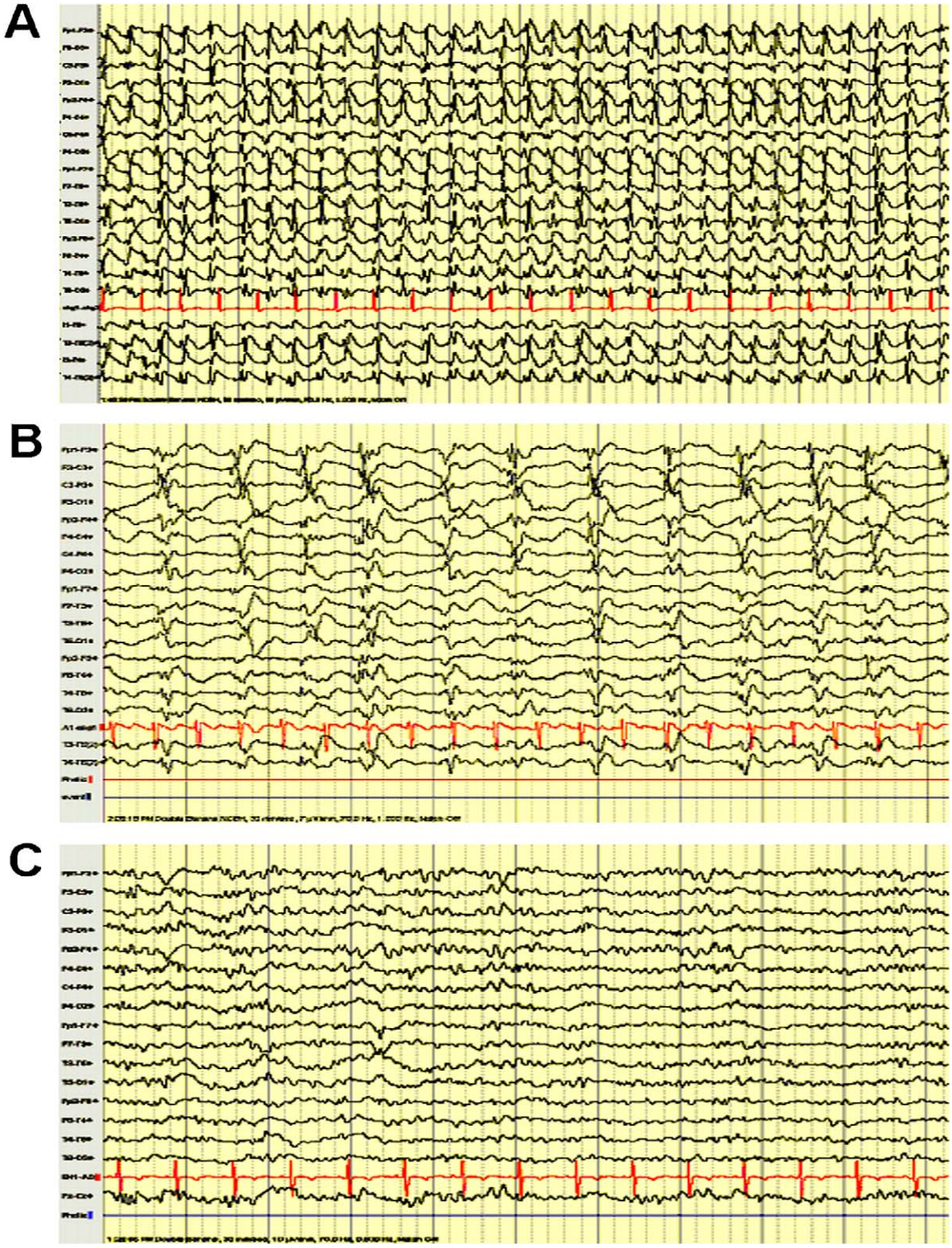

Fig. 1. Electroencephalogram evolution: NCSE shortly after the admission in A; after the final ECT stimulations in B; Post-hospitalization outpatient EEG (11 weeks after the discharge from hospital) in C.
(A) Generalized spike and wave lasting up to several hours on day of admission to EMU while on valproate, levetiracetam, and clonazepam; 30 μV/mm, 70 Hz.
(B) Remission of NCSE 14 h after the fourth course of ECT with slow background and BIPLEDs persisting a couple weeks after final ECT; 7 μV/mm, 70 Hz.
(C) EEG 11 weeks after hospital discharge showing rare left frontotemporal spikes; 10 μV/mm, 70 Hz.

2.3. ECT treatment

After unsuccessful attempts to wean from drug induced coma due to return of NCSE, ECT treatment was initiated on hospital day 14 with parental consent. The pediatric anesthesia team pretreated with atropine and rocuronium and vitals remained stable throughout the ECT course. Bitemporal electrode placement was selected to produce the most generalized seizure, given the lack of a clear seizure focus. A single frontal-mastoid EEG recording montage was employed using the MECTA ECT device, as the ECT stimulus would be damaging to the amplifiers used for full EEG monitoring. She received two consecutive ECT sessions with three