Refractory status epilepticus: Anesthetic management of a pediatric patient.

Author(s): TS Sangari, SR Shah, S Gopalakrishnan, LM Zabala

Affiliation(s): Arkansas Children’s Hospital & the University of Arkansas for Medical Sciences, Little Rock, AR

Introduction: Refractory status epilepticus (RSE) is status epilepticus, a condition of prolonged or repetitive seizures that fails to respond to antiepileptic drugs (4). We report management of a pediatric patient with RSE.

Case Report:
A three year old, term born, female child with past history of poorly controlled seizure disorder was admitted to pediatric intensive care unit for monitoring with continuous electro encephalographic (EEG) and management of RSE. Her past history was significant for having Steven Johnson syndrome with phenytoin and Phenobarbital and she was being treated with levetiracetam and topiramate at home. Valproic acid, oxcarbazepine and lamotrigine were added to her medical treatment on admission. However EEG revealed continuous multifocal electrographic seizures, for which propofol and midazolam infusions were initiated. With no relief in the seizure activity in following 12 hours a therapeutic trial of lidocaine infusion was administered. All of the above measures were ineffective and RSE still persisted. At this point ketamine infusion was added to on going medical management and it failed to yield the desired effect on EEG. After failing to control RSE medically a trial of hypothermia was administered without any benefit. Tonic clonic seizures however continued unabated and her condition started to deteriorate rapidly. She required vasopressor infusions (dopamine, norepinephrine, and epinephrine) for hemodynamic support. Propofol infusion was stopped due to developing acidosis and unstable blood pressure. At this point an attempt to control the seizures with inhalational anesthetic agent, isoflurane was made. Labile blood pressure limited the maximum isoflurane concentration to 0.7%, thus eliciting its minimal therapeutic effect.

Meanwhile, the patient developed congestive cardiac failure with pleural effusion and declining urine output. A pigtail chest tube was placed in right pleural cavity as her oxygen requirements increased. On electrocardiogram junctional wide complex tachycardia with atrio-ventricular asynchrony was noted. At this time a conscious decision was made to attempt palliative resection of seizure focus. On arrival to operating room ketamine, cis-atracurium, and isoflurane were used for the maintenance of anesthesia. Vasopressin was added to the vasopressor regimen with moderate success. The surgery lasted three hours after which her condition started to improve following disruption of the seizure foci. Right partial hemispherectomy was performed uneventfully and the patient was returned to intensive care for recovery. Over the next 24 hours, no seizure activity was recorded on continuous EEG. Her hemodynamic status and acidosis improved dramatically and vasopressors were titrated down and eventually stopped in next 24 hour period. She continued on levetiracetam, lamotrigine, zonisamide, and...
topiramate with satisfactory results. The clinical improvement continued but attempts to wean her antiepileptic drugs resulted in generalized tonic clonic seizures on EEG. Hence she was brought back to operating room after 2 weeks for the completion of the surgery. Right functional hemispherectomy was performed without any complications. Her seizure medications were tapered off in following three weeks from last surgery and she was discharged home.

**Discussion:**
SE refractory to all currently recommended medications is a relatively rare but challenging neurological problem. This child at the time of admission was already on multiple anti-epileptics. Addition of midazolam and propofol did not yield the desired results. So the lidocaine infusion was started with no relief in RSE. Lidocaine for its absence of respiratory side effects was chosen but it did not prevent RSE. After unsuccessful trial of lidocaine, Ketamine infusion was begun for its effects on N-methyl-D-aspartate receptor. Data suggests that ketamine may possess anticonvulsant properties, possibly by binding to the phencyclidine recognition site of the NMDA receptor. NMDA receptor blockade may be a protective response to the deleterious effects of excessive excitatory amino acid. Accordingly, ketamine may have both an anticonvulsant and a neuroprotective effect in SE (2). When all these measure failed to control RSE decision was taken to administer volatile inhalation anesthetic. But the utility of this therapy was limited due to inability to reach burst suppression doses (1.5 times the minimal alveolar concentration) with isoflurane secondary to unstable hemodynamic status (3).

In spite of the poor condition of the patient, as a last resort, after giving due consideration for the risks and benefits of an emergent neurosurgery, patient was brought to operative room for palliative hemispherectomy. This option turned out to be good decision. However, it appears that is rarely done during the medical crisis as the concern of compounding the risks of RSE together with those of neurosurgery. Previous series report significant mortality and universal morbidity with prolonged medical treatment for RSE.(4) Our case report highlights that surgery in patients with RSE due to focal etiology, may be used as a last resort and with proper management yield a favorable outcome.(4)

**Reference:**
(2) Neurology 1998;51:1765-6
(3) Anesth Analg 1999;89:1275-81
(4) Neurology 2005;64(3):567-570