

Role of thiopentone infusion for management of intractable status epilepticus in pediatric patients

Madhankumar Sathyamoorthy, Ramaswamy Govindarajan, Rafik Michael, Adel R Abadir, Mohammad Saad
Brookdale Hospital and Medical Center, Brooklyn, NY-11212

Introduction: Intractable status epilepticus not responding to conventional pharmacotherapy is a medical emergency. Rapid termination of seizures with prompt control of airway to ensure oxygenation, prevent aspiration, and minimize permanent neurological damage is the mainstay of management. Deeper suppression of cortical activity, documented electro cerebral silence and titrable length of time during which such electrocerebral silence can be maintained, make thiopentone the ideal drug for initial management of status epilepticus(1,2). Long lasting anti-epileptic drug regimen can be established during thiopentone induced burst suppression, which can then be tapered and discontinued with minimal chances of recurrence. We present our experience with 21 pediatric patients ranging from 1 ½ -16 years old admitted to intensive care unit in status epilepticus, treated with continuous thiopentone infusion.

Methods: 21 pediatric patients suffering from idiopathic generalized tonic clonic disorder with age of onset 12 months to 2 years were included in the study. All patients were admitted to pediatric ICU after initial management in the emergency room. Obtaining prompt control of airway and immediate control of seizures with boluses of thiopentone was the priority in the emergency room. Rapid sequence intubation with cricoid pressure was done with induction dose of thiopentone 4 mg/kg IV and succinylcholine 1.5 mg/kg IV and appropriate size endotracheal tube. Ventilatory management was with oxygen and air to maintain SaO₂ between 95-100%. Additional boluses of thiopentone 4mg/kg were administered at 5-30 minute interval until complete areflexia was achieved, while a continuous intravenous thiopentone infusion (0.5-4 mg/kg/hour) was maintained and titrated to obtain EEG burst suppression. Serum levels were maintained between 50-100 µg/ml. Central line, arterial line and urinary catheter placement were done in addition to EKG, pulse oxymetry and temperature monitoring. Continuous single channel processed EEGs using a cerebral function analyzing monitor (CCFAM) and intermittent multi-channel electroencephalogram (EEG) were done during thiopentone infusion and intensive care unit stay. Therapeutic end point was absence of electro cerebral seizure activity. Occurrence duration of status epilepticus before and during thiopentone infusion was recorded. After control of clinical and electroencephalographic seizure activity, patients were started on appropriate loading and maintenance infusion of phenytoin and phenobarbitone. Thiopentone infusion was progressively tapered over twenty four hours and finally discontinued once therapeutic serum levels were achieved for these antiepileptic medications. Statistical values were obtained from 2×2 tables of outcome versus EEG suppression employing Fisher's exact test with significance quantified as probability <0.05.

Results: Twenty-one patients were included in this study. Out of the 21 patients, 16 showed burst suppression and five showed "flat" record. Two patients in the burst suppression category showed recurrence of seizure activity after being controlled initially and none in the flat one. In these two patients, EEG seizures recurred earlier than clinical seizures, which were rapidly controlled with increasing the rate of thiopentone infusion. More sustained control of seizure activity was achieved by adding valproic acid to the anti epileptic regimen in these two patients.

Discussion: We conclude that, tightly controlled by serum levels, carefully monitored with EEG for therapeutic efficiency, initiating and tapering of thiopentone infusion in ICU setting with mechanical ventilation and hemodynamic monitoring, will allow the physician to establish therapeutic serum levels of conventional antiepileptic agents, reduce the relapse rate, avoid the mortality and long term morbidity associated with this life threatening medical emergency.

Table 1. Study outcome of thiopentone infusion for intractable status epilepticus.

EEG pattern	Burst suppression	"Flat"
No. of patients	16	5
Age (mean yr)	8.5	10.2
Duration of seizure (median h)	18	17
Duration of thiopentone treatment. (hr)	40.6	42.3
Relapse within one week of discontinuation of thiopentone	2	0

References:

1. Kaarkuzhali BK. et al *Epilepsia* 37(9):863-867,1996
2. Kaarkuzhali BK. Et al *Epilepsia*, 40(6):759-762,1999