

A study of treatment protocols of survivors and non survivors of status epilepticus in children

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Abstract

Background: Status epilepticus (SE) is a serious neurological problem in children. In this study we aimed to determine the etiology and outcome of SE in children treated according to aa protocol. **Aim and Objective:** To study the treatment protocols of survivors and non survivors of status epilepticus in children. **Methodology:** prospective study 40 patients admitted in PICU studied for status epilepticus. Data collected for demographic character, detailed history and clinical examination. Patient underwent all required investigations. Standard treatment protocol was followed by paediatric intensivist. **Results and Discussion:** Younger children are more vulnerable for SE. Out of the 30 survivors, 86.7% of patients required only the step I of protocol. Aggressive treatment at the time of admission is likely to decrease the mortality.

Key Words: epilepsy.

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INTRODUCTION

A seizure is defined as paroxysmal, time limited change in motor activity and or behavior that results from abnormal electrical activity in the brain. Seizures occur in 10% of children and most of them are provoked. Less than one third of them are unprovoked and develop epilepsy. Epilepsy is a major health problem in developed and developing countries and the overall incidence is 3-5%¹. It is the second most common condition seen by a neurologist. Status epilepticus is a common paediatric neurological emergency that requires immediate and rigorous management. It poses a therapeutic challenge to the treating physician. Treatment modality and outcome will depend on etiology of status epilepticus.

MATERIAL AND METHODS

There were 620 patients admitted to PICU during the study period out of which 40 met the definition of status epilepticus.

Inclusion Criteria: Patients aged > 2 months to 14 years, fulfilling definition of status epilepticus as per international classification of epileptic seizure.

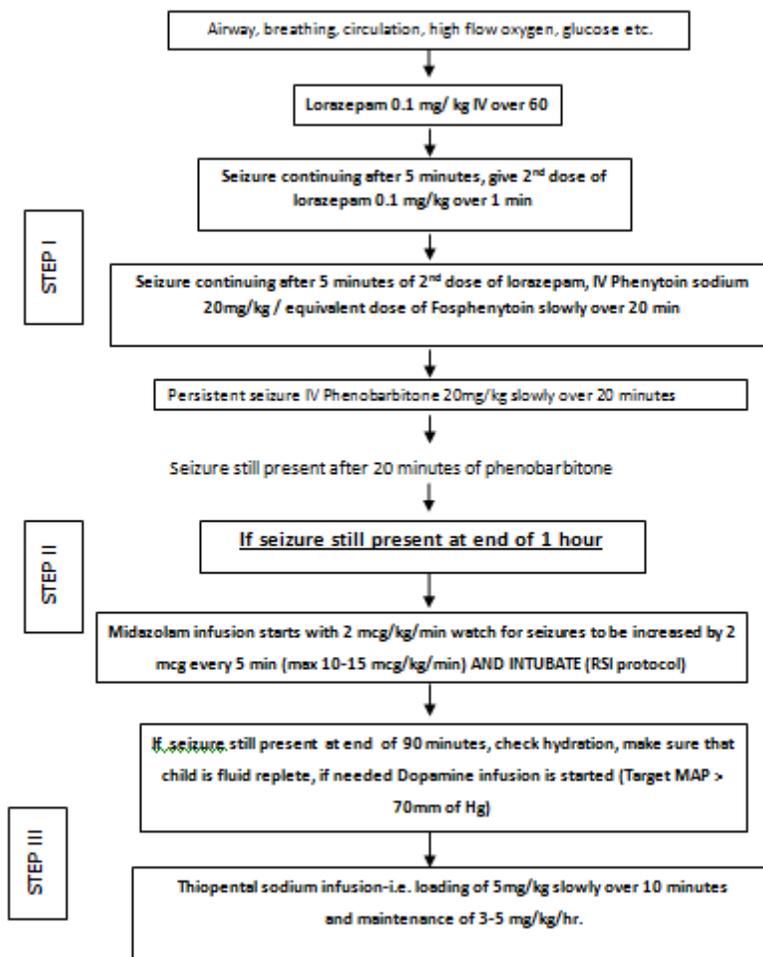
Exclusion Criteria: Seizure activity lasting for less than 30 minutes, Patients aged less than 2 months or more than 14 years, Patients, where duration of seizure activity could not be documented with or without regaining consciousness or patients whose case records had no time specification. This study was approved by institutional ethics committee, written informed consent was obtained from parents of the subjects. Data collected include detail history about associated diseases, family history. Clinical data was collected by general examination and systematic examination specially the neurological examination. In this study, modified Glasgow coma scale for children is used². Treatment protocol used for all patients as follows:

Initial Step: Emergency Room Protocol

- AIRWAY -clear airway (head tilt/chin lift or jaw maneuver) when indicated to open the airway. This can be very tough in patients who are vigorously

- convulsing, wherein we did give lorazepam and took control over airway simultaneously
- b. BREATHING –high flow oxygen, bag and mask device for respiratory support.
 - c. CIRCULATION –IV access, correct shock, correct hypoglycaemia (2 ml/kg of 10% dextrose), hypocalcemia (2 cc / kg of calcium gluconate), hyponatremia (1 c c / kg /hr of 3% hypertonic saline)

Management of seizure



Treatment on Admission: As per the above protocol Anticonvulsants used: 1st step (lorazepam, 2nd dose lorazepam, phenytoin, phenobarbitone upto 60 min) 2nd step (midazolam infusion at 60-90 min) 3rd step (coma induction after 90minutes with thiopental sodium)

Antibiotics: Antibiotics were used in patients with suspected bacterial infections. Most commonly used drugs were third generation cephalosporins or aminoglycosides or quinolones. Antimalarials were used in suspected cases of malaria. Acyclovir was started in suspected cases of herpes simplex or japanese encephalitis. Patients with suspected tuberculosis were started on antituberculous therapy with or without steroids.

Ventilation: Duration of ventilation

Hemodynamic supports: vaso active drugs needed /not needed

Clinical monitoring after admission

Vitals: Temperature (core, periphery), blood pressure, Heart rate, Capillary refill time, Pulse, central venous saturation in case of persistent shock and they were recorded Indication for intubation in case of status epilepticus were GCS<8,Persistent seizure requiring more than 3 anticonvulsants, Irregularities of respiration, Evidence of herniation Laboratory monitoring after admission was done for

- Etiology: complete blood count, Urine Routine, CSF, serum calcium, serum magnesium, random blood sugar, chest x ray, serum electrolytes
- Prognosis : EEG, MRI/CT
- Complications: hemograms, blood cultures, serum electrolytes, urine output, liver function tests, renal function tests.
- EEG- to look for the type of seizure and also for burst suppression on EEG.

Data at 48 hours

Heart rate, respiratory rate, capillary refill time, blood pressure, GCS., Data at the end of admission, Death, Survival

Etiology recorded Etiology of status epilepticus was determined on basis of history, clinical examination and relevant laboratory investigations.

RESULTS

Out of 620 patients 40 met the criteria of status epilepticus younger age group was more commonly involved. There were 80% children below 5 years of age. Male predominance was observed with 62.5%. 24 patients (60%) were from rural area and 16 (40%) patients were from urban area.

Table 1: Table showing duration of status epilepticus in survivors vs non-survivors (in hours) before admission to PICU

Parameters	Outcome		P-value
	Survivors N (%)	Non-survivors N (%)	
Duration of status (hours)			
<1	18 (60.0)	2 (20.0)	0.047
1-2	6 (20.0)	7 (70.0)	
2-3	3 (10.0)	0	
3-4	1 (3.3)	0	
4-24	2 (6.7)	1 (10.0)	
Total	30 (75%)	10 (25%)	

As shown in Table I, out of the 30 survived: 60% of patients had status for less than 1 hour, 20% patients had between 1-2 hours, 10% patients had between 2-3 hours, 3.3% patients had between 3-4 hours and 6.7% patients had between 4-24 hours. Out of the non survivors, 20% of patients had less than 1 hour, 70% of patients had between 1-2 hours and 10% of patients had between 4-24 hours. Thus, patients who survived had significantly shorter duration of seizures (p 0.047)

Table 2: Duration required to control seizures (minutes)

Parameters	Outcome		P-value
	Survivors N (%)	Non-survivors N (%)	
Time to control seizures (mins)			
<15	11 (36.7)	1 (10.0)	0.000
15-30	17 (56.7)	0	
30-45	2 (6.7)	1 (10.0)	
45-60	0	6 (60.0)	
≥60	0	2 (20.0)	
Total	30 (75%)	10 (25%)	

Out of the 30 survivors, 36.7% patients stopped convulsing in less than 15 minutes, 56.7% of patients in 15-30 minutes and 6.7% of patients in 30-45 minutes. Out of the 10 who died, only 1 stopped convulsing in less than 15 minutes, 6 took more than 45min and 2 more than one hour. Thus as shown in Table II, the seizures were controlled significantly early in survivors as compared to non-survivors (p 0.000). out of the 30 survivors, 33.3% of patients were from acute symptomatic group, 26.7% of patients were from febrile group, 20% of patients were from idiopathic group, 3.3% of patients were from progressive encephalopathy group and 16.7% patients were from symptomatic group. Out of the 10 non survivors, 80% of patients were from acute symptomatic group and 20% of patients were from idiopathic group (fig 1)

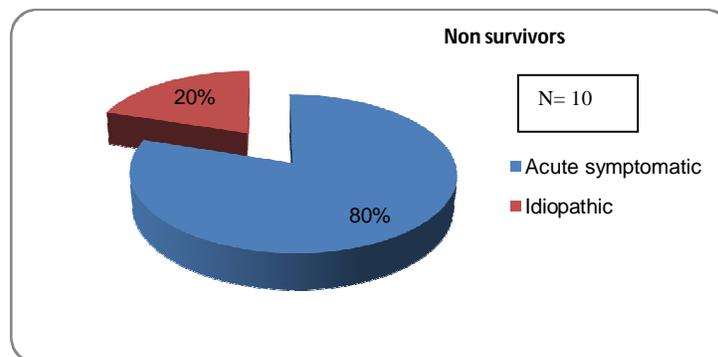


Figure 1: Showing distribution of etiology amongst survivors and non-survivors

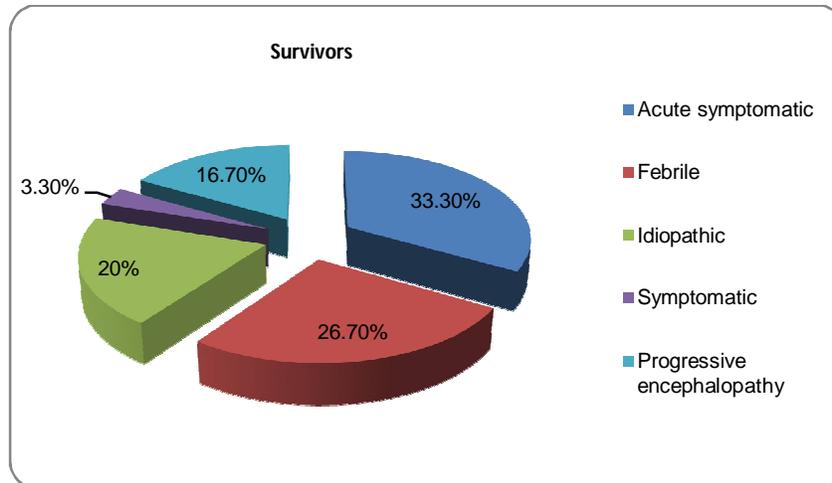


Figure 2:

Table 3: Showing comparison of blood pressure on admission and at 48 hours between survivors and non-survivors

Parameters	Outcome		P-value
	Survivors N%	Non-survivors N%	
Abnormal Blood Pressure(hypotension)			
On admission	3 (10.0)	10 (100.0)	0.000
After 48 hours	0	7 (70.0)	0.000

Out of the 30 survivors, 10% of patients had hypotension on admission and none had at end of 48 hours. Out of the 10 non survivors, all 10 (i.e.100%) patients had hypotension on admission and 7 (70%) of patients had at end of 48 hours. No child in our study had hypertension.

Table 4: Showing TREATMENT PROTOCOL. between survivors and non- survivors

Parameters	Outcome		P-value
	Survivors N%	Non-survivors N%	
Treatment Protocol			
Step I	26 (86.7)	0	0.000
Step II (step I plus midazolam)	3 (10.0)	6 (60.0)	
Step III (stepII plus Thiopental)	1 (3.3)	4 (40.0)	

Out of the 30 survivors, 86.7% of patients required only the step I of protocol which pertains to two doses of lorazepam and phenytoin sodium. Of remaining survivors, 10% of patients required step II (Midazolam drip upto 15 microgram/kg/min), and only 1 required step III (Sodium pentothal infusion) protocol. Out of the 10 non survivors, 6 patients (i.e. 60%) required upto step II of treatment protocol and 4(40%) patients required step III of treatment protocol.(p-value 0.000). this was

probably because the patients were hemodynamically unstable on admission.

DISCUSSION

Younger children are more vulnerable for SE is a well known finding and has been reported by Gulati *et al*³ wherein 56% patients were below 5 years of age, Hussain *et al*⁴ wherein 55% patients were less than 5 years of age and others^{5,6,7}. Male predominance is also seen in studies by Gulati *et al*³ and by Hussain *et al*¹². Out of the 40 patients 18 (45%) patients required mechanical ventilation, of which 8 survived. This was almost same to the study done by Gulati *et al*³, wherein 19 patients (63.3%) of the 30 required mechanical ventilation and out of which 10 survived. In the study by Hussain *et al*⁴, 19 (13.8%) of the 137 patients required mechanical ventilation. Amongst our patients 72.5% patients were referred while Hussain *et al*⁴ have shown that 59% of their patients received some kind of rescue therapy which is similar to our study. However in spite of receiving some kind of rescue therapy, many patients came from distant and remote places unaccompanied by doctors, not in an ambulance, without oxygen and IV access during transport. And this fact perhaps reflects in hypotension in 32.5% of our patients. The limitations in this study are its small numbers and short duration of follow up. It is not enough to just save the patients but intact survival is of paramount importance.

CONCLUSION

SE is a life threatening disease, but as shown in some studies from the western world, it is possible to reduce mortality to a significantly low level. This requires awareness of this condition amongst pediatricians and primary care physicians. Controlling seizures very aggressively without losing a single minute in the first

golden hour is clearly a priority. Aggressive treatment at the time of admission is likely to decrease the mortality.

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