International Journal of Contemporary Pediatrics
Jagannathan H et al. Int J Contemp Pediatr. 2017 Sep;4(5):1861-1865
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20173800

Original Research Article

Convulsive status epilepticus in children

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Received: 08 July 2017
Revised: 28 July 2017
Accepted: 05 August 2017

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ABSTRACT

Background: Present study was undertaken to study the clinical profile, immediate outcome and possible risk factors for mortality in children with convulsive status epilepticus, admitted in pediatric intensive care unit in a tertiary care centre.
Methods: This retrospective descriptive study included children between 1 month and 12 years of age admitted in pediatric intensive care unit with convulsive status epilepticus from April 2016 to March 2017. They were evaluated for their clinical presentation, laboratory parameters and immediate outcome. Data were gathered on 52 patients with convulsive status epilepticus. Factors were analysed using univariate and multivariate analyses.
Results: Among the 52 patients, the observations made were, common age group1-5years (51%), males (63%), wih fever (62%), idiopathic seizures (41.5%), febrile status epilepticus (22.7%) abnormal eeg (9.4%), leuocytosis (54.7%), csf abnormalities (33%), prolonged seizures (33%), need for intubation (31%), shock (29%), mortality (9.4%).
Conclusions: Clinical profile of children with convulsive status epilepticus is described. Presence of shock, need for intubation and prolonged seizures are significantly associated with mortality.

Keywords: Intubation, Seizures, Status epilepticus

INTRODUCTION

A seizure is a transient occurrence of signs and /or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. The International classification of epileptic seizures divides epileptic seizures into 2 large categories as focal seizures and generalized seizures. Generalized seizures are further classified as acute symptomatic, remote symptomatic, idiopathic and febrile status.

Acute symptomatic seizures occur secondary to an acute problem such as electrolyte imbalance, meningitis, encephalitis, acute stroke, or brain tumor. Remote symptomatic seizure is the one that is secondary to a distant brain injury, (old stroke). Idiopathic epilepsy refers to an epilepsy syndrome that is genetic or presumed genetic and in which there is no underlying disorder affecting development or other neurological function.[1] Febrile status is the febrile seizure lasting longer than 30 minutes.[2] Status epilepticus is defined as a continuous seizure activity or recurrent seizure activity without regaining of consciousness lasting for more than 5 minutes as part of an operational definition put forth within the past few years.

In the past, the cut off time was 30 min. The ILAE defines status epilepticus as a seizure which shows no clinical signs of arresting after a duration encompassing the great majority of seizures or recurrent seizures

without resumption of baseline central nervous system function interictally.

The incidence of status epilepticus ranges between 10 and 60 per 100,000 population. In the 1950s and 1960s, mortality rates of 6 to 18% were reported. Currently a lower mortality rate of 4-5% is observed, most of it secondary to the underling etiology rather than to the seizures. This study was aimed to describe the clinical features, investigations, background history, complications and outcome of children admitted with status epilepticus in a tertiary care centre, Chengalpattu.

METHODS

This retrospective descriptive study was done in Government Chengalpattu Medical College. Children between the age group of 1 month and 12 years who were admitted in the Pediatric Intensive care unit with convulsive status epilepticus from April 2016 to March 2017 were included.

Details like age, sex, duration and type of seizures, classification of seizures, presence of shock, need for intubation, leucocytosis, csf abnormalities, imaging and eeg findings, clinical outcome were obtained from the medical records. Also, details like past history of seizures, whether already on any antiepileptic drugs, developmental history and family history of seizures were also noted.

Operational definitions used. Even though generalized convulsive status epilepticus in adults and older children >5years refers to more than 5 min of continuous seizures or two or more discrete seizures between which there is incomplete recovery of consciousness, in view of most previous studies on status epilepticus having been done using the 30 minute definition, this study also has been done using 30 minutes definition.[3]

Prolonged or refractory status epileptius is defined as seizures that persist despite the administration of two appropriate anticonvulsants at acceptable doses, with a minimum duration of status of 60 minutes (by history or in observation).[3] Shock and indication for intubation are defined according to PALS Guidelines.

Statistical analysis

Statistical analysis was done using SSPS version 16.0. Prevalance of various demographic and clinical parameters is expressed in proportions. The relation between independent variables (clinical parameters) and the dependant variable (mortality) was determined using univariate analysis and the parameters with statistically significant relation were subjected to multivariate logistic regression. P value less than 0,05 was considered statistically significant. Crude and adjusted odds for each significant parameter were expressed with 95% confidence interval.

RESULTS

Totally 52 children between the age group of 1 month to 12 years were studied. Age and sex distribution is shown in Figure 1.

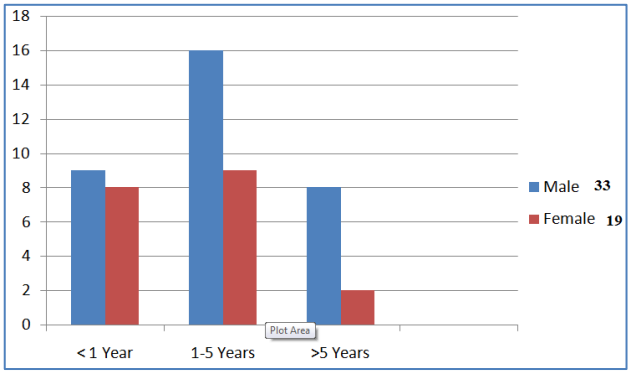

Figure 1: Age and sex distribution.

It can be observed that the incidence is more common in male children 33 (63%)and in the age group between 1 to 5 years. Generalized tonic clonic seizures is the most common type of seizures occurring in 43 (89.1%) 69.8% of the seizure episodes occurred in the awake state. History of fever was present 32 (62%) of children.

In 26.4%, the duration of fever was less than 24 hours whereas in it was more than 24 hours in 32.1%. 10 (18.9%) of children had a family history of seizures. Among the 52 patients 19 (35.8%) were already on antiepileptic drugs. 43 (81%) were developmentally normal children with age appropriate milestones. Prolonged or refractory seizures i.e. more than one hour was observed in 17 (33%).

On admission electrolyte abnormalities like hyponatremia and hypocalcemia were present in 5 (9.4%) children. Imaging showed abnormalities in 21 (39.6%). Features suggestive of cerebral edema was the most common imaging abnormality in 13children. Other findings were cerebral atrophy 5, parenchymal infarct 2 and 1 child had congenital cns malformation. Idiopathic seizures is found to be the most common cause (41.5%) followed by acute symptomatic in (30.2%).

Febrile status epilepticus occurred in (22.7%) and remote symptomatic in (5.7%). 23 patients had eeg done earlier among whom, 5 (9.4%) had abnormal eeg, 18 (34%) had normal eeg. Lumbar puncture a nd cerebrospinal fluid analysis was done for 30 patients among whom, abnormalities were detected in 10 (33%) and normal csf in 20 (67%).

Leucocytosis was observed in 29(54.7%) children. Seizures recurred within 24 hours of admission in 34%, more than 24 hours in 13.2%. The mortality of status epilepticus in our study was 5 (9.4%). 22.6% stayed for more than 14 days.

The presence of shock along with seizures was found to have significant impact on the outcome as shown in Table 1. 4 out of 5 children who died had features of shock along with seizures at the time of admission and 2 children who presented with seizures and shock recovered. This is found to be statistically significant.

Table 1: Clinical parameters and outcome – univariate analysis.

Variable	Category	Outcome		X	P Value	Odd:s ratio 95% CI
		Death N %	Discharge N%			
Shock	present	4 (7.5%)	11(20.75%)	7.272	0.0263	13.45 1.3592 -133.1811
	Absent	1 (1.9%)	37 (69.8%)			
Intubation	present	4 (7.5%)	12 (22.64%)	6.500	0.0332	12.0000 1.2193 – 118.1049
	Absent	1 (1.9%)	36 (70%)			
Repeat seizures within 24 hrs	present	3 (5.7%)	15 (28%)	2.421	0.219	3.3000 0.4983-21.8540
	Absent	2 (3.8%)	33 (62%)			
Abnormal CSF	present	2 (3.8%)	10 (18.9%)	4.233	0.3427	2.5333 0.3714-17.2806
	Absent	3 (5.7%)	38 (71.7%)			
Leucocytosis	present	4 (7.5%)	25 (47%)	1.424	0.2592	3.6800 0.3827-35.3836
	Absent	1 (1.9%)	23 (43%)			
Developmental delay	present	2 (3.6%)	8 (15%)	1.6111	0.2247	0.3333 0.4773-23.2794
	Absent	3 (5.7%)	40 (75.4%)			
Fever	present	3 (5.7%)	29 (54.7%)	3.623	0.4855	0.9829 0.1499-6.4432
	Absent	2 (3.6%)	19 (36%)			
Prolonged seizures	present	4 (7.5%)	13 (24.5%)	5.820	0.0412	10.7692 1.0994-104.4922
	Absent	1 (1.9%)	35 (66%)			

Similarly, 16 patients required intubation as a part of management of status epilepticus. Among the 16 intubated patients, the mortality was 4 (25%). Individual clinical parameters were analysed for association with mortality using univariate analysis and the results are shown in Table 1.

Table 2: Clinical parameters and mortality. multivariate logistic regression analysis.

Variable	Odds ratio	P Value
Shock present vs absent	7.272	0.007
Intubation present vs absent	6.500	0.011
Repeat seizures within 24 hours present vs absent	2.299	0.129
Abnormal CSF present vs absent	3.301	0.069
Leucocytosis present vs absent	1.424	0.233
Fever present vs absent	3.623	0.057
Prolonged seizures present vs absent	5.820	0.016

Presence of shock, need for intubation during seizure management and prolonged seizures were identified as significant risk factors for mortality. The variables were subjected to multivariate analysis with logistic regession and the results are depicted in Table 2. Presence of shock, need for intubation and prolonged seizures emerged as independant risk factors for the mortality in children admitted with status epilepticus.

DISCUSSION

The most widely used definition for status epilepticus is a seizure lasting for more than 30 minutes or recurrent seizures for more than 30 minutes during which the patient does not regain consciousness. More recently an operational definition has also been suggested for adults and children older than 5 years (Generalizedconvulsive status epilepticus in adults and older children >5years refers to more than 5 min of continuous seizures or two or more discrete seizures between which there is incomplete recovery of consciousness.

It has been observed in our study that the incidence of status epilepticus is more common in the age group between 1 and 5 years. Similar finding was observed in a study done by Smith DM who has stated that the incidence of status epilepticus is relatively low in children above 5 years of age.[4]

Raspall M et al also has shown in his studythat the incidence of convulsive status epilepticus is highest among children less than 5 years.[5] The incidence is more common in male children 33(63%).Similar male

preponderance is seen in a study done by Besli and Saltik.[6]

The cause of convulsive status epilepticus varies across age groups. Shinnar et al in their study has shown that febrile status epilepticus and acute symptomatic etiologies are more common in children less than 2 years whereas remote symptomatic and idiopathic etiologies are common in older children.[7] In present study, idiopathic seizures was the most common cause of status epilepticus (41.5%) followed by acute symptomatic seizures (30.2%). Similarly, earlier studies done by Karaine and Alexis have shown that acute symptomatic status epilepticus and idiopathic seizures as the most common etiological category in children 66%.[8]

The incidence of febrile status epilepticus is almost similar in both the studies.[1] Majority of the convulsive status epileticus occurred in a previously neurologically healthy children (81%) in present study which is similar to earlier study.[9] On analysing the mortality, 1 child in idiopathic group, 1 in remote symptomatic, and 3 in acute symptomatic group had died. 17 patients had prolonged or refractory seizures in present study (33%), among whom 4 patients died. On statistical analysis this factor is found to be significantly associated with the mortality.

A study done by Maytal J, Shinnar S has shown that children with seizures less than 1 hour have a better prognosis than do those with prolonged status epilepticus.[10] In this study we observed that only 12 out of 16 patients who were intubated during management of status epilepticus survived with a mortality of (25%). Similarly, 11 out of 15 patients with features of shock on admission survived with a mortality of 27%). On statistical analysis, these two clinical parameters are found to be significantly associated with the mortality.

Failure to manage the airway and breathing during seizure management could result in profound hypoxia and shock, which if not identified and corrected early in the management of seizure could result in deleterious effects on myocardium and brain. Hence failure to manage the coexisting hypoxia, shock, myocardial dysfunction, hypoglycemia and status epilepticus simultaneously could result not only in mortality and also have an impact on the final neurological outcome. Failure to provide effective ventilatory support during the management of status epilepticus is perhaps one of the most frequent causes of morbidity and mortality in our country.

Shock in status epilepticus could occur due to hypoxic myocardial dysfunction, coexisting sepsis or a neurogenic distributive shock. Shock which occurs in convulsing children secondary to both seizure activity and other causes complicating status epilepticus severely deranges the cerebral physiology. Aggressive management of shock based on etiology is mandatory for intact neurological survival.[11] In present study, it was found that the need for intubation snd the presence of shock during the management were significantly associated with the mortality. Among the individual parameters, prolonged seizures was significantly associated.

The strength of our study is that it was done on a reasonable amount of data and was analysed using robust statistical methods, Limitations are that it is a retrospective study done by analysis of case records. Further sample size calculation was not done to determine risk factors for mortality.

CONCLUSION

Clinical profile of children admitted with status epilepticus in a tertiary care centre was described. Presence of shock, need for intubation and prolonged seizures are significantly associated with mortality.

Recommendations

Children with features of shock, prolonged seizures and those who need intubation need close monitoring and prompt management to prevent mortality. Further, prospective studies with appropriate sample size calculation are required to determine poor prognostic features.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Jagannathan H, Palanivelu S. Convulsive status epilepticus in children. Int J Contemp Pediatr 2017;4:1861-5.