

Frequency of Mortality in Children Admitted with Status Epilepticus in King Abdullah Teaching Hospital Mansehra

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Abstract

Objectives: To determine the frequency of in-hospital mortality in children admitted with convulsive status epilepticus and to analyze the relation of age, gender, seizure duration, and etiology with mortality.

Methodology: This descriptive case series was conducted at the paediatric department of King Abdullah Teaching Hospital Mansehra from September 2020 to October 2021. A total of 114 children aged 1-13 years diagnosed with status epilepticus were enrolled after their caregivers gave informed consent. Their demographic features (age, gender, address, seizure duration, etiology and response to therapy) were recorded. The children were managed as per Canadian Pediatric Society guidelines. The final outcome, mortality, and its associations were recorded on a proforma during a maximum 14 days hospital stay.

Results: The overall mortality was 8.77%. The most common cause of status epilepticus was idiopathic status epilepticus (28.95%), followed by encephalitis (25.44%). The mean \pm SD duration of seizures was 17.10 \pm 6.77 minutes with a range of 6-28 minutes. There was no statistically significant association between mortality and age, gender, cause of status epilepticus and duration of seizures ($p > 0.05$).

Conclusion: Status epilepticus is frequently encountered medical emergency in pediatric population with a diverse etiopathogenesis. Despite advances in medicine, the morbidity and mortality associated with status epilepticus still remain very high.

Key words: Epilepsy, Encephalitis, Meningitis, Mortality, seizures, status epilepticus.

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Introduction

Status Epilepticus is one of the life threatening neurological emergencies of childhood, with an overall incidence of 20 per 100,000 children per year.¹ Definition of status epilepticus has been revised as per the Neurocritical Care Society guidelines from 2012 to emphasize early and prompt treatment. Currently It is defined as continuous seizure activity or recurrent seizure activity without regaining of consciousness lasting for more than five minutes.² Common causes of status epilepticus include intracranial infections

(encephalitis, meningitis, and cerebral malaria), electrolyte disturbance, hepatic encephalopathy, drug induced, cerebral palsy, brain malformations, cerebral tumors, and degenerative brain problems.^{3,4} Acute symptomatic etiologies or infections are the commonest cause of status epilepticus^{5,6}, and these have been more commonly seen in children under five years.⁴

Status epilepticus is divided into convulsive form (generalized tonic, clonic or tonic-clonic) being more common than non-convulsive accounting for 91.4% cases and nonconvulsive form (complex partial, absence). Known determinants of poor outcome in

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status epilepticus are age less than 2 years, duration of seizure more than 90 minutes, failure to respond to anti-convulsive treatment and acute infectious etiology.⁷ Sequelae of status epilepticus are epilepsy, recurrent status epilepticus and neurological impairment such as motor deficit, problem of cognition and language.⁸ The prevalence of epilepsy following convulsive status epilepticus is 5%.⁹ New neurological deficit has been reported in 25.7% of cases.⁵

Considering the burden of mortality and morbidity, treatment of convulsive status epilepticus has been standardized and proper guidelines are available.¹⁰ After maintaining airway, breathing and circulation short acting benzodiazepines are used for maximum of two intravenous shots 5mins apart.¹¹ Failure to control seizures permit the use of second line anticonvulsants which include phenobarbitone, phenytoin, levetiracetam and valproic acid ;all having comparable efficacy with difference of probable adverse effect.¹² Metabolic derangements are simultaneously assessed and treated accordingly. Children of less than 18months can also be candidate of intravenous pyridoxine. If seizures cannot be controlled with first and second line anticonvulsants then they are termed as refractory seizures which necessitate the use of third line anticonvulsants like midazolam infusion, high dose phenobarbitone ,paraldehyde ,propofol and thiopental.¹³ In our study, the same protocol of management was used.

Limited availability of local data and need of continuous surveillance motivated us to conduct a study in our setup to estimate the in -hospital mortality of convulsive status epilepticus in pediatric population and to assess mortality predictors so that they can be addressed promptly.

Material and Methods

A descriptive case series study was conducted in the Department of Paediatric Medicine, King Abdullah Teaching Hospital, Mansehra Pakistan from September 2020 to October 2021. Non-Probability, consecutive sampling was used. The WHO sample calculator was used to calculate sample size. 114 cases were calculated with a 95% confidence level, 5% margin of error, and taking expected percentage of in-hospital mortality, i.e. 8%⁵ in children with status epilepticus.

Children presenting with status epilepticus, in whom seizures last more than 5 minute² aged 1 month-15

years irrespective of etiology of seizures were enrolled. Severely malnourished children and those with comorbid illnesses such as Chronic Renal Failure, Chronic Liver Disease, Congestive Heart Failure, Congenital Heart disease were excluded from the study.

Sample collection was started after taking ethical approval from the institutional ethical review committee (ERC approval no.2915/PED). Informed consent was taken from parents/caregivers before patient enrolment. Patients admitted in Paediatrics "A" unit of King Abdullah Teaching Hospital Mansehra who met inclusion criteria, were included. Their demographic details like age, gender address were noted. Etiology of status epilepticus was recorded on a predesigned proforma. Patients were managed for status epilepticus as per Canadian pediatric society guidelines ¹⁰. Seizure duration and response to treatment was documented. Patient outcome during maximum of 14 days' hospital stay was monitored during which in hospital mortality and its risk factors of mortality were noted. Data was analyzed using SPSS version 16. Descriptive statistics were calculated. Chi-square test was used for comparison of variables at 5% level of significance.

Results

Total 114 patients were enrolled. The females comprised the majority (n=59; 51.75%) of study population while the rest (n=55; 48.25%) were males. The Mean±SD age of study population was 6.25±2.86 years with a range of 1-13 yrs. Similarly, the Mean ±SD duration of seizures was 17.10±6.77 minutes with a range of 6-28 minutes. Regarding seizure etiology, the most common cause of status epilepticus observed was idiopathic status epilepticus (28.95%), followed by encephalitis (25.44%), meningitis (20.18%), febrile seizures (14.04%), and poor compliance with anti-convulsive drugs (11.40%). About 16(14.04%) cases had refractory seizures meaning that they did not respond to two anticonvulsants. while in-hospital mortality was 10(8.77%) in the study. Age, gender, seizure duration and infectious etiology were not found to be a significant predictor of convulsive status epilepticus related mortality (p>0.05) (Table I)

Discussion

The significant findings of our study included a considerable mortality (8.77%) among the study population, idiopathic status epilepticus being the most

common etiology and absence of significant relationship of fits duration with risk of mortality. Moreover, even after using standard guidelines of seizure management quiet a significant percentage (14.04%) of study population did not respond to two anticonvulsants at maximum therapeutic doses.

Table I: In-hospital mortality predictors in convulsive status epilepticus.			
Variable	Expired	Survived	p-value
Gender			
Male (10)	5	50	0.91
Female (59)	5	54	
Age			
<7 years (74)	7	67	0.72
>7 years(40)	3	37	
Etiology			
Infectious (10)	7	61	0.49
Non-infectious(104)	3	43	
Seizure duration			
Upto17 minutes (59)	5	54	0.91
>17 minutes(55)	5	50	

The results of our study are quite comparable with other studies conducted globally. A local study from Lahore reported a male dominance (56%) among study population of convulsive status epilepticus, a much smaller age group involvement (mean 1.09 years) and Idiopathic status epilepticus as least common etiology (9%) of convulsive status epilepticus. All these results were just the opposite of our study findings. The reported mortality in that study was much higher (22%) as compared to our study.¹⁴ Having a look at international statistics, in a study from Iran a large multicenter pediatric cohort was studied for evaluation of in hospital mortality and predictors of death associated with convulsive status epilepticus. The study results revealed male dominance in study population and affected mean age of 6.2 years which is similar to our study. Mortality, however, was much lesser (0.9%). Independent risk factors for death in patients with SE, assessed by multivariate calculation, included near drowning, hemorrhagic shock, sepsis massive aspiration, mechanical ventilation >96 hours, structural brain lesion, hypoglycemia and sepsis with liver failure. African American ethnicity was associated with a decreased risk of death in SE.¹⁵ In Saudi children a mortality rate of 2.6% in pediatric patients with status epilepticus was recorded, much lower than our study result. However, the frequency of refractory seizures was quiet higher than our study (40.15%). There was no significant relationship observed between refractory

status epilepticus and the patients' age, gender, date of initial drug intake and type of seizure.¹⁶ Febrile convulsions were the most commonly identified etiology. Similar results were obtained while scrutinizing the etiology of status epilepticus in a retrospective study conducted in Jaddah (Saudi Arabia) during same period. Other identified etiologies in decreasing frequencies were electrolyte imbalance, hydrocephalus, CNS infections and neoplasms and cerebrovascular accidents.¹⁷

The frequency of refractive seizures was although quite significant in our study (14.04%) but it was much less than that found in our neighboring country India where 45.2% cases of convulsive status epilepticus progressed to refractory seizures. Acute CNS infections and cerebrovascular accidents were most common etiology found in study (60.3%). Mortality in refractory seizures was found 21.2% while surviving patients significantly developed neurological sequel at one year of age.¹⁸ Our study highlighted another point that seizure duration was not a significant predictor of mortality. Same observation was noticed in another local study at agha Agha Khan Hospital Karachi, conducted much earlier (in 2003). Mortality frequency was much higher in that study (25%) as compared to our one but they also did not found a significant relationship between age, gender and seizure duration with risk of convulsive status epilepticus related mortality.¹⁹

Our study had few limitations. This was a single center based study with a small sample size therefore the results do not reflect the general trends in the population. A larger study observing encompassing various biochemical and clinical parameters to study their role in prognosis of status epilepticus should be carried out to determine true spectrum of factors affecting the prognosis of status epilepticus.

Conclusion

Status epilepticus is a frequently encountered complication of a number of disease conditions, including CNS infections and is associated with significant morbidity and mortality. A thorough understanding of the pathogenesis and etiology of status epilepticus can help decrease the associated morbidity and mortality.

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