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Audit of the management of convulsive status epilepticus in children: the need for a uniform treatment strategy.

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Audit of the Management of Convulsive Status Epilepticus in Children: The Need for a Uniform Treatment Strategy

We conducted a two-year prospective audit to review the paediatric management of Convulsive Status Epilepticus (CSE) in Ireland. Our audit showed that there is considerable variability in the management of CSE in this country. In order to provide optimum care for this potentially life-threatening condition a uniform management strategy is required. We propose a protocol for the treatment of CSE, which should ensure uniform management and optimum care and also provide a template for further study and audit of this important disorder.

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Abstract

We conducted a two-year prospective audit to review the paediatric management of Convulsive Status Epilepticus (CSE) in Ireland. Our audit showed that there is considerable variability in the management of CSE in this country. In order to provide optimum care for this potentially life-threatening condition a uniform management strategy is required. We propose a protocol for the treatment of CSE, which should ensure uniform management and optimum care and also provide a template for further study and audit of this important disorder.

Introduction

Convulsive Status Epilepticus (CSE) is defined as a continuous convulsion lasting more than 30 minutes or the occurrence of serial convulsions between which there is no recovery of consciousness. Management of this acute condition requires an aggressive uniform therapeutic approach. The British Paediatric Neurology Association has published guidelines for the management of CSE in children [1]. However, an informal survey of consultant paediatricians in this country revealed considerable variation in the management of this potentially life-threatening condition. We conducted a two-year prospective audit to review the paediatric management of CSE in Ireland.

Methods

Using an active monthly reporting card system coordinated by the Irish Paediatric Surveillance Unit (IPSU) one hundred and twenty nine participating paediatric consultants working in both the Republic of Ireland and Northern Ireland were asked to notify all cases of CSE. Children with non-convulsive and partial status epilepticus were excluded. Responding consultants were asked to complete a questionnaire to determine the management strategies used in the reported cases.

Results

CSE was reported in eighty-three children over a two-year period from Jan 2000 to Dec 2001. Questionnaires were returned in twenty-two. The results showed that rectal diazepam (19) was the anti-epileptic drug of first choice but there was considerable variation in the use of subsequent antiepileptic drugs when diazepam failed. Intravenous diazepam (9), lorazepam (5) and phenytoin (4) were the preferred second line anti-epileptic agents (Table 1). Phenobarbitone was not used in any patient.

Table 1. Choice of anti-epileptic drugs	
1st Line Drug	Diazepam (19)
2nd Line drug	Diazepam (9)
	Lorazepam (5)
	Phenytoin (4)
	Midazolam (2)
3rd Line drug	Phenytoin (7)
	Midazolam (4)
	Lorazepam (1)
	Paraldehyde (1)
4th Line drug	Paraldehyde (3)
	Midazolam (2)
	Lorazepam (1)
	Phenytoin (1)
5th Line Drug	Diazepam (1)
	Midazolam (1)
6th Line	Midazolam (1)

Endo-tracheal intubation was required in five cases of which two required thiopentone anaesthesia to achieve seizure control. Most episodes of CSE required 2 to 4 intravenous anti-epileptic drugs to achieve seizure control (Table 2). There was also considerable variation in the dosages of intravenous anti-epileptic drugs used (Table 3). Febrile status was the commonest cause of CSE in this patient population (Table 4).

Table 2. Number of anti-epileptic drugs required to achieve seizure control	
1 AED	2 (9%)
2 AEDs	6 (27%)
3 AEDs	7 (32 %)
4 AEDs	4 (18%)
5 AEDs	1 (5%)
6 AEDs	2 (9 %)

Table 3. Dosages used to achieve seizure control		
	Mode (mg/kg)	**Range (mg/kg)**
Diazepam (p/r)	0.50	0.5--1.1
Diazepam (i/v)	0.50	0.16--0.96
Lorazepam	0.10	0.1--0.2
Phenytoin	18	7.7--23
Midazolam	0.20	0.05--0.2
Paraldehyde	200	200-500

Table 4. Causes of Convulsive Status Epilepticus	
Febrile seizure	10 (59%)
Symptomatic epilepsy	6 (35%)
Known Epilepsy	3 (18%)
First Presentation	1 (6%)

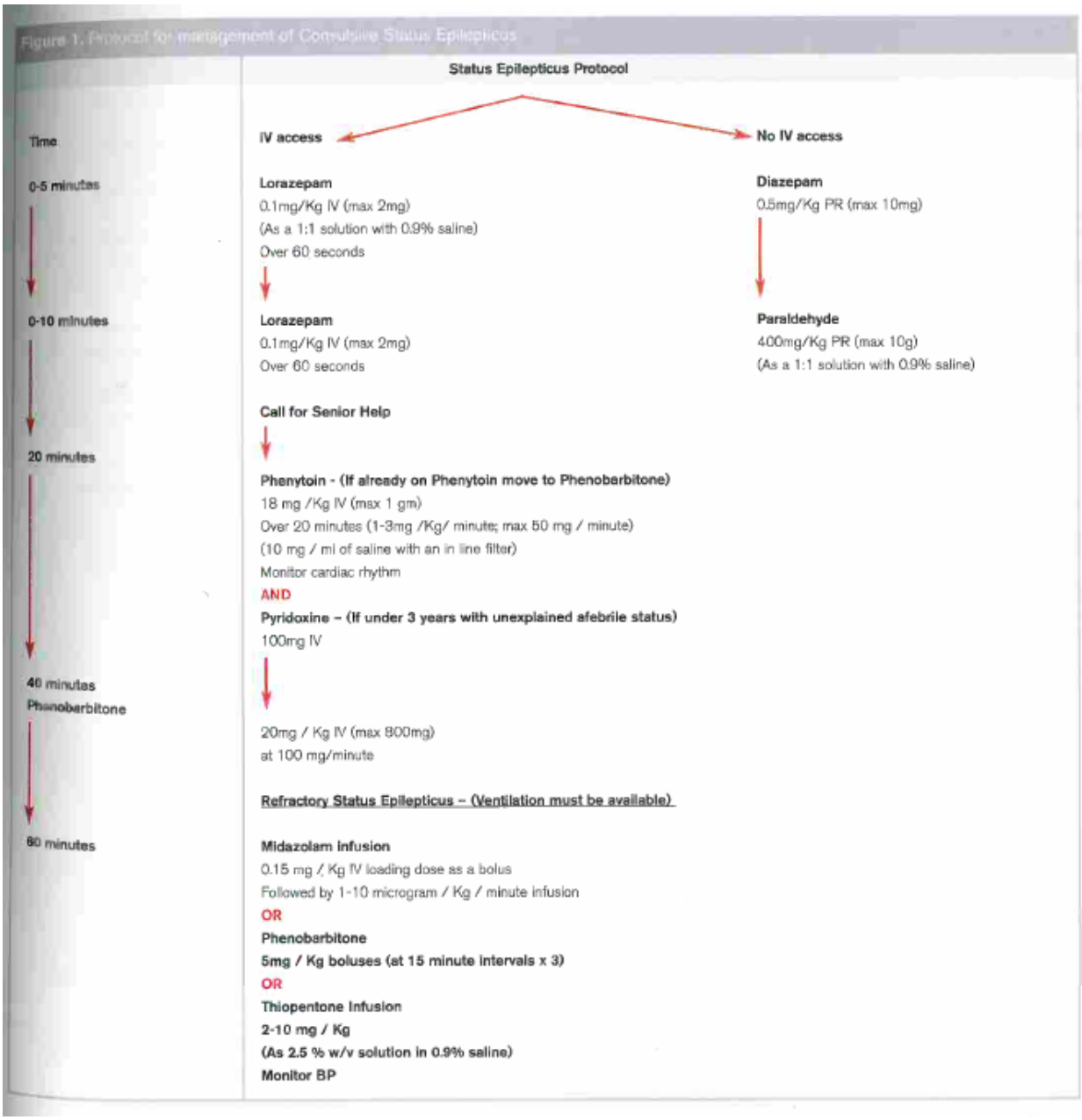
Discussion

CSE is the commonest paediatric neurological emergency. The exact incidence is unknown but is estimated to be 40-60 per 100,000 children per year. This may often be symptomatic of an acute brain injury (such as meningitis, encephalitis, trauma) or chronic encephalopathy (e.g. brain malformation). However one third of patients with CSE have an idiopathic cause (i.e. new onset epilepsy)[2]. Febrile CSE is considered to be a separate subgroup of idiopathic origin. Aicardi and Chevrie reported a mortality rate of 11% [3] however more recent studies suggest 2-9 % [4,5, 6]. Hauser has estimated mortality attributed to CSE by itself to be no more than 1-2% with complications of CSE accounting for the remainder. CSE is also associated with neurological morbidity ranging from minor neurological impairment to the persistent vegetative state. One study found a morbidity rate of 23% [7]. Children had both cognitive and persisting, mainly minor, neurological deficits.

Trends vary in the management of CSE throughout the world but basic principles are the same. Thus, initial management of the patients airway and circulation is critical. The cause of CSE, if present, must be identified and treated. The goal of pharmaco-therapy is to stop the seizure activity as soon as possible. Our study confirms that there is considerable variation in the pharmacological treatment of CSE. It is evident from our study, that administration of a rapidly acting drug such as a benzodiazepine is the initial step in management. There is a marked paucity of data on which anti-epileptic drugs should be given beyond this stage if administration of a benzodiazepine fails to control seizure activity. One study concluded that lorazepam was more effective than phenytoin as a first line therapy but no more efficacious than phenobarbitone or diazepam[8]. Lorazepam has been suggested as a preferred agent because of its rapid onset of action (1-5

minutes), a prolonged duration of effect (12-18 hours), less respiratory depression and ease of administration. Newer agents including midazolam and phosphenytoin have also been used successfully in CSE.

Our study shows considerable variation in the dosage used of individual AEDs and the need to use 2-4 AEDs in 77% of cases to achieve seizure control. In a survey of 694 members of the Intensive Care Society in the United Kingdom only 12% used a specific protocol for management of CSE in their units [9]. As a result of differences in management practices the UK Status Epilepticus Working Party proposed uniform national guidelines for treating CSE [1].



The Neurology Department at Our Ladys Hospital for Sick Children, Crumlin has produced and implemented a protocol for the management of CSE since 1998. This protocol, based on the limited clinical data and accepted principles for the management of CSE in children, is similar in principle to the protocol proposed by the UK Status Epilepticus Working Party. We propose that this protocol (Fig 1) be used as standard in our Accident and Emergency Departments where children between the ages of one month to 16 years presenting with CSE are treated. Furthermore, this protocol could form the template for future collaborative studies testing new regimes and therapeutic agents in the management of CSE in children.

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