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Editorial

Paediatric status epilepticus—A series of timely reviews

Status epilepticus in children is a common and serious condition that requires urgent treatment. A number of developments have occurred in the past few years that have changed clinical practice– and the publication of this supplement is very timely. Advances have been made in various research areas and the thirteen articles in this supplement provide a good overview of some of these.

First are the fields of epidemiology and early therapy, in which a series of very influential studies have been recently carried out. As a result of these, the frequency and outcome of paediatric status have now been put on a more sound basis. Some aspects of this work are reviewed in the article by Grinspan and Gurcharran [1]. Studies in epidemiology often result only in the dry accumulation of statistics, but in the case of status epilepticus, the recent epidemiological research has highlighted ways in which prevention and more effective therapeutic strategies might be possible, and have underpinned the substantial improvements which have been made in acute therapy. The timing of initial treatment has become a crucial central issue, as summarised in the article by Gaínza-Lein and colleagues [2]. Gone are the days when prolonged convulsions were treated with casual insouciance, and the importance of out-of-hospital treatment in paediatric status epilepticus is now rightly stressed. The widespread availability of buccal and other non-IV and non-rectal treatments and the new protocols for urgent treatment – sometimes empowering parents to take the lead – have been, in my opinion, the most important public heath achievements of contemporary epileptology. A focus on rescue medicine in seizure clusters is another facet of early treatment and is the topic of the review by Jafapour and colleagues [3]. Linked to this has been evolution of a range of seizure detection devices and algorithms, reviewed here in the article of Amengual-Gual et al [4], and these provide an interesting approach both to the identification of seizure-onsets and also to their prevention. The acute therapy of status epilepticus in pre-hospital and in-hospital setting is the topic of the interesting review by Stredny et al [5], which proposes the establishment of acute" seizure-code" teams in hospitals as one strategy to improve time-to-treatment and the first in-hospital response.

Another most important development has been the elucidation of the underlying mechanisms of status epilepticus. Chief amongst these, in the past decade, have been the advances in understanding of the role of GABA receptor trafficking in the pathophysiology of status epilepticus and in status-induced drug resistance. This has been an important influence on new therapeutic developments in both early and refractory status epilepticus. This and other physiological discoveries are reviewed in the article of Fernández et al [6].

Assigning causation in epilepsy is not necessarily a simple matter, as status epilepticus is often a multifactorial condition in which the cause depends to a significant extent on the perspective taken. The cause can be seen from the viewpoint of molecular mechanisms (Hughling Jackson's "proximate" cause) or from that of the clinical pathologies (Jackson's "remote" causes) or from the external (environmental) or the internal (genetic) causes, precipitants and susceptibilities. There have also been breath-taking advances in the elucidation of underlying genetic causes especially in neonatal and early childhood status (the childhood encephalopathies), and in also in the understanding of the clinical features of the newly defined concept of super-refractory status epilepticus. Vasquez et al [7] review the aetiology and clinical features of refractory and super-refractory status epilepticus, and outline the evidence (or lack of it) underpinning therapy in this dangerous clinical situation. Another concept, which has arisen in relation to refractory status epilepticus, is that of NORSE (New Onset Refractory Status Epilepticus), is reviewed in the article of Sculier and Gaspard [8]. Attempting to unify a condition caused by a ragbag of aetiologies is inherently unsatisfactory, and a definition which includes viral and autoimmune causes seems especially so, but there are patients in whom status arises de novo and in whom no cause is uncovered. In such patients immunotherapy is often given blindly, without robust evidence to supporting the practice, and this too is a topic where better research is urgently needed.

Important advances have also been made in the investigation and monitoring of status epilepticus. Some new neuro-imaging modalities are reviewed by Guerriero et al [9], but it is the application of intensive EEG technologies which has made the greatest contribution and these are reviewed by Sansevere et al [10]. Controversy rages about the utility of continuous and/or invasive EEG monitoring, and this is one area where practice diverges greatly at different centres and in different countries and is to a great extent driven by financial considerations, and where Health Technology Assessment of 'added value' is needed.

It is interesting to note that the developments in the field of aetiology, and particularly those related to genetics, have not yet much impacted on treatment. The promise of personalized medicine in status epilepticus, with therapy based on an individual's genetic make-up still remains after years of work only a distant promise (despite the hype and enormous investment of funds). Nevertheless, treatment has moved on, and in recent years a series of impressive advances in treatment approaches have been made and definitive clinical trials reported. A range of new medicinal compounds has become available, often derived from conventional drug classes, and these are reviewed in the article of Amengual-Gual et al [11]. There have also been developments in non-medicinal therapy reviewed by Arya and Rotenberg [12].

Finally, to outcome and to prognosis. The factors influencing prognosis have been the subject of intensive study. Jafarpour et al [13] provide a review of this topic, based on a literature search, and as is pointed out, prospective controlled multicentre studies with large sample sizes, with validated standardised outcome measures are the gold standard. These are now feasible, and steady progress has been

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made towards obtaining reliable and meaningful outcome data.

Status epilepticus has indeed risen in prominence in epilepsy, and its treatment has greatly improved and continues to improve. The articles in this supplement show how this field is moving forward. The journal, and the invited editors Drs Tobias Loddenkemper and Iván Sánchez Fernández, are to be warmly congratulated in putting this supplement together.

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