The circular dilemma of seizure-induced brain injury

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Sir, I read with interest the elegant paper by Payne and colleagues (Payne et al., 2014) and its accompanying editorial (Holmes, 2014) because they touch the ‘Holy Grail’ question for neurologists, intensivists, neurosurgeons and neonatologists, particularly in the scenario of intensive care units (ICU): the hypothesis of seizure-induced excitotoxicity (SIE). It is especially relevant in developing countries as Brazil, where resources are scarcer and video-EEG or EEG-monitoring are not available in many ICU.

Payne et al. allowed us to conclude that, taking into account the studied confounding risk factors, seizure burden of >12 min is an independent marker for neurological decline. However, it does not support the notion of SIE given to the problem of circular reasoning. An independent association is not proof of a causal and direct association between seizure activity and worse outcomes.

As the authors state, the demonstration of a causal link will require a randomized controlled trial of anti-epileptic drug therapy and the results of Payne and colleagues’ study will serve to the design of such trial.

Three hypotheses still should be considered on this issue: (i) SIE always occurs if duration and/or frequency the abnormal electrical activity reaches a threshold; (ii) SIE never occurs; and (iii) SIE does occur if an underlying condition is present as hypoxic-ischaemic, metabolic, inflammatory insult, acquired or hereditary ion channel dysfunction.

Before this problem is solved, the old precept of non-maleficence should be contemplated and we must carefully weigh the possible adverse effects of high-dose and multiple anti-epileptic drugs against their benefits.

References

Holmes GL. To know or not to know: does EEG monitoring in the paediatric intensive care unit add anything besides cost? Brain 2014; 137: 1276–7.