Impaired Consciousness in Partial Seizures Is Bimodally Distributed.


OBJECTIVE: To investigate whether impaired consciousness in partial seizures can usually be attributed to specific deficits in the content of consciousness or to a more general decrease in the overall level of consciousness. METHODS: Prospective testing during partial seizures was performed in patients with epilepsy using the Responsiveness in Epilepsy Scale (n = 83 partial seizures, 30 patients). Results were compared with responsiveness scores in a cohort of patients with severe traumatic brain injury evaluated with the JFK Coma Recovery Scale–Revised (n = 552 test administrations, 184 patients). RESULTS: Standardized testing during partial seizures reveals a bimodal scoring distribution, such that most patients were either fully impaired or relatively spared in their ability to respond on multiple cognitive tests. Seizures with impaired performance on initial test items remained consistently impaired on subsequent items, while other seizures showed spared performance throughout. In the comparison group, we found that scores of patients with brain injury were more evenly distributed across the full range in severity of impairment. CONCLUSIONS: Partial seizures can often be cleanly separated into those with vs without overall impaired responsiveness. Results from similar testing in a comparison group of patients with brain injury suggest that the bimodal nature of Responsiveness in Epilepsy Scale scores is not a result of scale bias but may be a finding unique to partial seizures. These findings support a model in which seizures either propagate or do not propagate to key structures that regulate overall arousal and thalamocortical function. Future investigations are needed to relate these behavioral findings to the physiology underlying impaired consciousness in partial seizures.

Consciousness in Focal Seizures: Either You’re In or You’re Out

As physicians who treat patients with epilepsy, we find ourselves considering whether the seizures patients describe to us have sufficient impact to warrant removal of driving privileges or other special safety considerations. These decisions are often clear-cut, based on the patients’ or observers’ descriptions. When a patient indicates that they are not aware of their own activities—or the activities of those around them—it is relatively easy to determine that consciousness is impaired, and therefore driving privileges should be removed. However, there are seizure descriptions that seem to fall on a gray line: For example, the patient who experiences the seizure may relate that they are aware of the presence of others throughout the seizure, can hear conversations, but perhaps cannot report or remember exact conversations because the experience of the seizure is “so intense” that it takes all of the person’s attention. Often under these circumstances, the patient will report that they “could” attend to these external stimuli if they “really tried.” Two clinicians, hearing this description, might come to different conclusions as to whether the patient experienced impairment in consciousness. This has led to intense debates about whether seizures can really be subdivided into what (in the old seizure terminology) was described as “simple partial” and “complex partial” (1) and in the new terminology described as “with and without dyscognitive features” (2), or whether seizures lie on a continuum that cannot be arbitrarily divided.

The debate took off when the 2001 ILAE Task Force on Classification and Terminology published its new proposed classification and suggested that the terms simple partial and complex partial be abandoned, stating, “These terms are no longer recommended, nor will they be replaced. Ictal impairment of consciousness will be described when appropriate for individual seizures, but will not be used to classify specific seizure types” (3). This issue continues to be hotly debated (4, 5). Recently, readers of the journal Epilepsia were asked to take a poll (results pending at the time of this writing) in which they were asked whether such a dichotomy should be included in the new classification of epilepsy (still in flux) and, if so, what it should be called. Many are unhappy with the term “dyscognitive,” newly created for the 2010 ILAE revised classification (2). Those who favor “dichotomy” have offered alternative nomenclature, such as “focal with intact consciousness seizures (FICS)” versus “focal with altered consciousness seizures (FACS)” (6). In contrast, a recent proposal penned by no less than 43 esteemed authors suggested that “there are at least five types of alterations of consciousness that occur during epileptic...
seizures: auras with illusions or hallucinations, dyscognitive seizures, epileptic delirium, dialeptic seizures, and epileptic coma,” and suggested that there were different underlying pathophysiological mechanisms for each (7).

What is a poor epileptologist to do? Cunningham’s research, described here, pragmatically simplifies the debate by providing evidence that rather than a “sliding scale of consciousness,” a dichotomy exists. To steal a term from Heidi Klum (describing contestants on Project Runway), when considering consciousness in epilepsy, “either you’re in or you’re out.” In the study, patients experiencing focal seizures were asked to perform a series of tasks, and from the very first task (the examiner indicated the time and asked the subject to repeat it), they were either able to respond with little to no difficulty, or they were completely unable to complete the requested tasks. Although the tasks were created to assess different types of cognitive function (e.g., expressive and receptive language, memory, visual processing), impairment on one task predicted impairment on all, suggesting that at least for these 30 patients, their impairment was not content specific. If this finding holds up, it would seem to indicate that dichotomizing seizures is appropriate and defensible.

But is life that simple? Only 30 patients were examined as part of this study. This was a convenience sample, and there was no attempt to ensure that patients who fit into the “gray zone,” as exemplified above, were included. Seizure descriptions from video-EEG (provided in the supplemental material) did not suggest subtle altered awareness (for example “chewing, lip smacking, staring to the right”), nor were patients asked whether they remembered all or part of their seizure, or whether they thought they were impaired (which would have provided interesting insight).

Is this research helpful? Undoubtedly, it is, as it provides a way forward in the debate. As always, the best answer to any question—no matter how controversial—is arrived at with empirical data. If the results presented here hold up as more seizures on the spectrum of consciousness are assessed, the question of whether “consciousness” (or awareness or responsiveness—whatever name is ultimately accepted) in epilepsy is dichotomous might be definitively answered. End of debate (finally).

by Jacqueline French, MD

References
Instructions
The purpose of this form is to provide readers of your manuscript with information about your other interests that could influence how they receive and understand your work. Each author should submit a separate form and is responsible for the accuracy and completeness of the submitted information. The form is in four parts.

1. **Identifying information.**
   Enter your full name. If you are NOT the main contributing author, please check the box “no” and enter the name of the main contributing author in the space that appears. Provide the requested manuscript information.

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   This section asks for information about the work that you have submitted for publication. The time frame for this reporting is that of the work itself, from the initial conception and planning to the present. The requested information is about resources that you received, either directly or indirectly (via your institution), to enable you to complete the work. Checking “No” means that you did the work without receiving any financial support from any third party – that is, the work was supported by funds from the same institution that pays your salary and that institution did not receive third-party funds with which to pay you. If you or your institution received funds from a third party to support the work, such as a government granting agency, charitable foundation or commercial sponsor, check “Yes”. Then complete the appropriate boxes to indicate the type of support and whether the payment went to you, or to your institution, or both.

3. **Relevant financial activities outside the submitted work.**
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