Consciousness Unchained: Ethical Issues and the Vegetative and Minimally Conscious State

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Nothing piques the interest of philosophers more than the meaning of consciousness. Recently, this word has also permeated both the research and clinical neuroscience community. From a neurological perspective, consciousness is simply felt to be the mirror image of unconsciousness. Unconsciousness is one of the most common clinical syndromes, with literally thousands of patients acquiring that label everyday. Most have reversible unconsciousness due to a metabolic or toxic insult such as severe electrolyte imbalance, major organ failure resulting from pronounced renal or liver disease, or suppression of brain activity due to administration of a central nervous system depressant. In these cases one can predict recovery of consciousness with some degree of clarity.

As clinicians we venture into the grey zone of the meaning and importance of consciousness when we are faced with the diagnosis of the vegetative state (VS) or the minimally conscious state (MCS). In the provocative essay by Fins and colleagues (2008), the enormous neuroethical issues raised by this patient cohort are addressed from a variety of viewpoints. The authors focus on the problem from the researcher’s perspective, the family perspective, and, most importantly, the patient’s perspective. The article nicely lays out the diagnostic dilemma faced by clinicians when evaluating a patient who by definition has impaired capacity to “state their own case.” The authors also delve into the ethical dilemmas confronting the family and clinicians entwined in decisions about how best to provide the level of care the patient may have wanted. The authors nicely review the extant literature on the VS and MCS and point to recent single case reports suggesting that the diagnosis may not be so distinct and the internal word of the patient with MCS and perhaps even VS may be richer than the standard dogma suggests. Most of this work is based on functional magnetic resonance imaging (fMRI) studies and this emerging literature raises further issues about how best to clinically and, by inference, physiologically characterize these patients.

A series of recent fMRI case reports has provided a hint that the boundary between the conscious state (CS) and MCS may not be so distinct. From a neurologist’s perspective this is not so surprising. The diagnosis of brain death is easy. The electroencephalographic recording (EEG) must show a “flat line” with no evidence of any cortical activity, often referred to as electrocerebral silence. Importantly, the insult must result in irreversible structural damage to the brain either at a microscopic level (i.e., hypoxic-ischemic insult) or macroscopic level (i.e., massive intracerebral bleed). Of course, there must be no evidence of potentially reversible toxic–metabolic causes that can cause transient flattening of the EEG. However, in the VS or MCS the EEG is by definition not flat and typically shows widespread slowing of brain rhythms. Does this mean that nothing is being processed? The answer is a definite “no.” A clear analogy is the emerging literature on the depth of processing of environmental input (i.e., the surgeon talking about something in the operating room) while the patient is under anesthesia with widespread EEG slowing akin to that observed in VS and MCS. By this logic it would be surprising if some sensory input were not being processed in all VS patients and certainly in all MCS patients. By extension, one might also propose that some internal thoughts are being generated in these devastating clinical states.

Indeed, the key issue from the neurologist’s perspective is whether the neurological insult, whether prolonged hypoxia or severe traumatic brain injury, will leave any meaningful brain function. So, it is not clear if the key issue is “consciousness” or the clinical experience with these patients per long-term recovery of “meaningful” life. Of course, meaningful is as poorly defined as consciousness and herein lies the quandary. This conundrum stresses the pre-injury intention of the patient to live in a VS or MCS. Some might opt for any “life” but most would not enjoy the prison of VS or MCS. Without knowing ante-injury it is hard to make the right clinical call. However, clinicians are asked to make
these decisions everyday for a host of maladies in addition to VS and MCS. It would seem that the scholars addressing the neuroethical issues involved in the diagnosis and treatment of VS and MCS need to take a hard look at how clinicians make diagnostic decisions in a range of life-threatening and life-altering maladies.

The authors make a case for the use of fMRI in the evaluation of the “level of consciousness.” However, it is not clear whether this is the best approach in delineating treatment decisions if a real neuroscience of consciousness is to emerge. fMRI has technical challenges, particularly with movement correction, that are compounded in an uncooperative patient. fMRI is also an indirect measure of neuronal activity. Furthermore, islands of activation do not mean much unless functional connectivity can be established. While all these issues are the subjects of intense research, they remain problematic in wide-scale application of fMRI to the diagnosis and eventual treatment of VS and MCS patients.

Techniques such as EEG or magnetoencephalography (MEG) may provide a better measure of neuronal activity for gauging the neural basis of the level of consciousness. Consider, for instance, what happens when a loud noise awakens you from sleep. You awake in a few hundred milliseconds and this change in the level of consciousness is accompanied by rapid EEG changes occurring in the millisecond range. However, if you could also obtain an fMRI, the changes found would not be evident for seconds. This suggests that fMRI is unlikely to unravel the neural basis of consciousness, which likely involves rapid, distributed neural activity. This does not diminish the research power of fMRI but rather points to the potential use of electrophysiological methods in the elucidation of the VS/MCS spectrum. Surprisingly, not much has been done in this regard. One could make a case that insertion of a subdural electrode strip would be a better marker of “consciousness” and predictor of VS and MCS. While this may seem too invasive at first glance, these subdural grids are now in clinical trials for epilepsy and may emerge as a useful method for brain machine interface treatment of disabling motor disorders. Since these strips can provide continuous monitoring of cortical function, they should at least be considered for evaluation of the VS and MCS before putting all the eggs into the fMRI basket. The exciting finding by Schiff and colleagues using brainstem stimulation for MCS points to the use of electrophysiological methods in the treatment of VS and MCS. Why not combine stimulation with subdural recordings and possibly infusion of neuropharmacological agents into key target sites?

Finally, we need to be cautious about how these patients are discussed, since there are literally tens of thousands of families hanging with baited breath hoping that their loved ones will emerge from the netherworld of VS or MCS. Case reports capture attention but are inherently limited in their predictive value. It is encouraging that the workshop participants are cognizant of this issue and are making efforts to apply standard clinical trial approaches to this fascinating yet clinically devastating problem. As such, this treatise should be required reading for all healthcare personnel involved in treating patients with a diagnosis of the vegetative or minimally conscious state.

REFERENCE