

Commentary: Neurobiology, Suffering, and Unconscious Brain States

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The case presented illustrates ambiguities concerning the state of consciousness and the management of patients with catastrophic brain injuries. The ethical problem presented centers on the administration of a morphine infusion in the hope of achieving an appearance of lessened "distress" in a comatose patient who exhibits an increased respiratory rate drive as the result of primary neurologic and metabolic causes. The house officer identifies difficulties in providing a mechanistic account of the possible level of awareness in the patient and the possibility of pain and suffering.

The neurological evidence in the case is limited and consists of findings consistent with intact brainstem function, except for autonomic dysregulation of the pupillary responses, and a CT scan that indicates possible bilateral cerebral infarctions. Accepting the evaluations of the trained physicians who examined the patient and reviewed the films, we may conclude that the patient's comatose state is irreversible on the basis of overwhelming hemispheric injuries. In this context, setting aside a possible misreading of the data and the precise role of the manifold infectious and metabolic contributions to the patient's coma, there can be no reasonable expectation that the patient was either aware of pain or capable of suffering. This clinical judgment is guided by the level of con-

sciousness identified by the neurological exam and the knowledge that patients expressing this level of dysfunction who recover do not relate evidence of awareness of these states. This conclusion is further supported by metabolic studies that demonstrate correspondence of overall brain function in coma with the levels obtained under general anesthesia.

Though the borders of neurological expertise regarding awareness in other conditions remain less distinct, the reasonable inference in this comatose patient is that no "distress" accompanied the increased respiratory rate. Morphine may be "therapeutic" to well-intentioned staff or the grieving family, but this is not a physiologic indication for morphine.

The strong argument for lack of pain or suffering in the unarousable and unresponsive (i.e., comatose) patient above takes on greater subtlety when applied to other severe disturbances of consciousness such as the persistent vegetative state.¹⁻³ In the persistent vegetative state, a patient recovers cyclical arousal, alternating periods of sleep and "wakeful" (eyes-open) states without evidence of awareness or interactive behavior. Such patients are equally unresponsive and exhibit similar resting metabolic activity to that of comatose patients. However, the appearance of an eyes-open, wakeful, state tends to raise greater concern for the untrained observer that pain and suffering are now possible. These concerns, for example, would be considered unwarranted in a patient undergoing open heart surgery under anesthesia. The concept of the vegetative state has remained a clinically useful and qualitatively distinct designation for these patients who fail to recover any aspect of interactive behavior or hint of awareness following a severe brain injury.

The neurobiology underlying the vegetative state is gradually unfolding, with recent studies demonstrating that small islands of preserved cerebral function may exist in these overwhelmingly damaged brains and correlate with fragments of semipurposiveful-appearing behavior.¹ In this setting, however, the diagnosis of the vegetative state remains clear. These patients remain clinically unconscious, and whatever fragments of behavior exist cannot be conditioned or developed into a communication channel. More important, detailed brain imaging in these patients reveals a consistent picture of overwhelmingly decreased metabo-

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lism, cell loss, and abnormal electrophysiological measures of primary sensory processing.¹ This evidence strongly supports the same conclusion that pain and suffering do not attend the globally unconscious, vegetative state despite the presence of a fragment of expressed cerebral function.

As recovery extends beyond a vegetative state into less well-examined categories such as minimally aware or minimally conscious states,⁴ our neurobiological understanding lags at present and inferences concerning awareness of painful stimuli are uncertain. The question of awareness of a painful stimulus and suffering, however, requires separation. It is possible, and maybe likely, that these patients who exhibit minimal interaction with their environment do register painful stimuli. It is unlikely, however, that sustained memory and attentional resources are present to allow them to gain a reflective self-awareness of any enduring discomfort that could be considered suffering.

As further research identifies the cognitive capacities present in severely injured brains, a rational and ethical approach to the issue of pain and suffering in such borderline states of consciousness should be possible.

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