CLINICAL ETHICS: DEBATE

A definition of human death should not be related to organ transplants

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Kerridge *et al* recently published a paper in the journal about organ transplantation and the diagnosis of death.[1] Although I appreciate the authors' efforts to present their arguments about such a controversial issue, I found some inconsistencies in this article that I would like to discuss

When Kerridge and his collaborators discussed the origins of the concept of brain death (BD), they emphasised that after the report of the medical consultants on the diagnosis of death to the US President's Commission was published in 1981,[2] clinicians equated the concept of BD with brainstem death. In fact, the *brainstem* criterion was first proposed by Mohandas and Chou in Minnesota, in 1971.[3] The Minnesota criteria inspired the UK code, which was mainly adopted in UK commonwealth countries.[4] This view was afterwards powerfully defended by Christopher Pallis.[5] After the US President's Commission report,[2] a lot of countries, and most US states, accepted the whole brain, and not the brainstem, criterion.[6]

Regarding the "dead donor rule", with the advent of transplant surgery, interest in definitions and diagnosis of death based on brain formulations really acquired a new urgency. None the less, it is important to point out that the concept of BD as death of the individual, did not appear to benefit organ transplantation, but was a consequence of the development of intensive care. As Pallis emphasised, if organ transplant techniques had never been developed, intensive care procedures would have provided the possibility of supplying life support to those cases with destroyed brains and preserved heart function, and physicians would need to face the clinical syndrome called BD.[5] When French neurophysiologists and neurologists described the *death of the nervous system* and *coma dépassé*, organ transplant techniques were only in the very early stages of development.[5 6]

Also Kerridge *et al* only discussed the notion of integration related to the brainstem death criterion. I have recently discussed and rejected this criterion, proposing a new standard of death on neurological grounds, based on the irreversible loss of consciousness, which causes an irreversible absence of the capacity for integrating the main human attributes with a functioning body.[7 8] My criterion of death is also different from the so called higher brain criterion, because I argue that the criterion of death is related to the irreversible destruction of the anatomofunctional substratum which is necessary for the functioning of the components of consciousness, arousal, and awareness, based on anatomy and physiology throughout the brain.[6–8]

Shewmon recently remarked that "clinical evidences of brain death is more attributable to multisystem damage and spinal shock than to destruction of the brain *per se*", but also remarked that "the brain role is one of modulating, finetuning, and enhancing an already established and well functioning system".[9] If we accept Shewmon's view, then a specific emotional state could influence—for example, the immune system, either diminishing or enhancing the immune response. We can ask ourselves: can we consider the brain's effect on other systems, of "modulating" or "finetuning" the highest level of integration within the organism?

Of course activity that can be recorded by encephalogram (EEG) may be preserved in brainstem dead patients, which undoubtedly reflects cortical activity. In cases fulfilling the *brainstem criteria of BD* with primary brainstem lesions and preserved cerebral hemispheres, stimulation of the non-specific thalamic nuclei might produce some degree of arousal. Hence brainstem death alone is not brain death.[7 8]

Kerridge and his collaborators introduced the subject of *irreversibility* based on the use of human embryonic stem cells for neural system repair. Of course, *irreversibility* is closely related to the technological advances of any given period of history, taking into consideration the criterion of death operating at that time. Some decades ago a heart asystole usually caused death. Nowadays, reanimation techniques allow patients to recover after several minutes of a cardiocirculatory arrest. Moreover, hypothermia and other neuroprotective techniques can prolong the period of a cardiocirculatory arrest after which a patient can fully recover, the brain being the target organ which definitely defines the quality of life.[6–8] During the Third International Symposium on Coma and Death (Havana, 2000), Alan Shewmon presented a striking video of a boy who became brain dead at the age of four and who, on ventilator support, showed spontaneous heartbeating at that time (16 years later), with a completely destroyed and liquefied brain. Hence, it will surely be possible to keep "alive" a brain dead case, or a decapitated subject, even without a functioning heart, with ventilatory assistance and using some kind of extracorporeal machine, for decades. Are we preserving a corpse or a human being?

I conclude that a definition of human death should not be related to organ transplants. Maybe in the near future, xenotransplants, or cloning techniques which can produce organ and tissues, will replace transplants from brain dead donors. None the less, physicians will still need to face and deal with this controversial state: *brain death*.

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COMMENTARY

In any contentious issue, particularly those relating to the beginning and end of life, uncertainty and disagreement are inevitable. Machado offers a thoughtful and considered perspective on brain death and organ transplantation that reflects his extensive clinical and philosophical expertise in this area. In general, Machado appears to disagree with us regarding the history of brain death and some aspects of our argument but agrees with us when he concludes that "a definition of human death should not be related to organ transplants".

Machado is correct when he notes that brain stem criteria for death were first proposed by Mohandas and Chou and that following the US president's commission report, many countries accepted a "whole brain" definition of death.[1 2] This confusion between differing definitions of death and criteria for a diagnosis of death is at the root of much of the legislative, non-legislative, and clinical confusion regarding brain death. A review of the literature supports our contention that the terms brain death and brain stem death are frequently used interchangeably and that many clinicians equate brain death with brain stem death. In the United Kingdom, the criteria for the diagnosis of brain stem death and the clinical methods for confirming it have been accepted practice for many years.[3] The UK courts have also consistently emphasised that it is the death of the brain stem and not loss of higher brain functions that constitute the minimum criterion for death.[4]

Machado is also correct in noting that substantive explorations of brain death only followed advances in intensive care and the capacity to support ventilation and circulation. It is not accurate, however, to suggest that changing notions of death did not benefit the transplant programme. While advances in intensive care unit (ICU) technology would inevitably have led to exploration of the neurological basis of consciousness and death in the absence of a transplantation agenda, the concept of brain death was undeniably given an urgency, a medical, political, and legal imperative, by society's increasing "need" for organs for transplantation. While the link between brain death and organ transplantation is frequently denied, it remains self evident that it is only in the context of organ transplantation that a diagnosis of brain death is required. Life support can be withdrawn from patients with irreversible neurological damage, irrespective of whether they are in an ICU or not and regardless of whether they are judged to be brain dead or not, depending upon the wishes of the patient or their surrogates and an assessment of the burdens and benefits of treatment. People are only buried or cremated and their property distributed, when they satisfy circulatory criteria for death. It is only where vital organs are sought that a diagnosis of brain death is required. While it may be true to argue that the concept of brain death did not originate to benefit organ transplantation, there can be little doubt that it has been necessary to legitimise the process of "donation" and the expansion of the transplant programme.

It is difficult to be certain whether Machado argues for or against the notion that the brain is the critical integrating system of the body and that its loss implies death of the organism as a whole. We would share with Machado the belief that a diagnosis of brain death has important philosophical significance, as it causes irreversible loss of personhood (Machado's "main human attributes"), and prognostic significance, as it implies that the patient has permanent and irreversible loss of consciousness and that death is certain without continuation of ventilatory and intensive care support, but would not accept that this adequately defines death. In other words, patients who satisfy brain stem death criteria, (as a surrogate marker for brain death), have no hope of recovery and may be considered potential donors for organ transplantation. They are not, however, dead, as the term "death" should be reserved for those who have irreversible cessation of circulation.

We argue that the definition of death should not be related to organ transplantation and that it is biologically, philosophically, and socioculturally more accurate to regard "brain death" as a state separate from death. We acknowledge that this shift in thinking would pose clinical and legal challenges to the practice of organ transplantation and would inevitably mean that the "dead donor rule" would need to be replaced with a "good as dead donor rule" or something similar. Despite this, we believe that such a shift would make the process of "donation" and transplantation more honest and transparent, and may make death in hospital more commensurate with the community's understanding of death.

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