Disputes in the Declaration of Brain Death: A Case Illustration

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Abstract

Death by neurologic criteria is a legal definition upheld in all 50 states in the United States. Confusion among the public may cause the declaration of death to be disputed and the removal of physiologic support delayed. In this report, a case is described of an infant who died from traumatic brain injury, but whose removal from respiratory and cardiovascular support was delayed due to a legal injunction brought forth from his family against the hospital. In addition, ethical issues faced by the health care team are discussed surrounding continuing medical therapies for a patient after the declaration of death.

Keywords

- brain death
- ethics
- legal

Introduction

The Uniform Determination of Death Act (UDDA) was approved and recommended for enactment in all 50 states in the United States in 1980 by the National Conference of Commissioners of Uniform State Laws and approved by the American Medical Association and the American Bar Association.¹ This document, created in response to the technological advances in medicine that allowed for the artificial support of circulation and respiration in the absence of brain activity, recognized the irreversible loss of brain function as a determinant of death.^{1,2} Most states have adopted the UDDA; several states have added amendments that define the medical standards for determining brain death. Although there is medical and legal acceptance of the cessation of brain function as a determinant of death and published practice guidelines on the determination of brain death for adults³ and children,⁴ the declaration of death due to loss of brain function can be difficult to comprehend for families and even medical professionals. A recent case in the United States in which the declaration of brain death in a 13-year-old child in California was contested by her family led to the unprecedented continuation of artificial cardiorespiratory support and placed the subject of death determination in the national spotlight.⁵ In the following report, a similar case is described

in which the family of an infant who died from inflicted head trauma contested his declaration of death, leading to a lengthy legal battle and the utilization of considerable health care resources to maintain the physiologic functions of his cardiovascular and respiratory systems.

Case

The patient, an 8-week-old male, was admitted to the pediatric intensive care unit (PICU) following an out-of-hospital cardiopulmonary arrest. Per report, the patient was born at term via normal spontaneous vaginal delivery and had no medical problems. Three days prior to admission, the infant was reported to have a subjective fever, cough, and increased fussiness. On the day of admission, the child's father reported he placed the infant on the couch and when he returned, found him limp and unresponsive. The child was taken by his father to an urgent treatment center at which time he suffered a cardiopulmonary arrest. Cardiopulmonary resuscitation with chest compressions and bag-mask ventilation was initiated and the infant had return of spontaneous circulation (ROSC). The infant was transported to the emergency department of our hospital where he was found to be unresponsive. He was immediately intubated, suffered another cardiopulmonary arrest, and required a

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bolus dose of epinephrine prior to ROSC. An intraosseous line was placed for fluid resuscitation and medication administration. Blood and urine cultures were obtained and empiric antibiotics were administered. Initial significant laboratory findings were venous blood gas measurements of pH 6.96, $p\text{CO}_2$ 81 mm Hg, HCO_3^- 18 mmol/L, and base deficit of -13 mmol/L, white blood cell count of $21.3 \times 10^3/\mu\text{L}$, hemoglobin of 7.1 g/dL, and platelets of $169 \times 10^3/\mu\text{L}$. Blood chemistry results were significant for aspartate aminotransferase of 56 U/L, alanine aminotransferase of 131 U/L, and glucose of 196 mg/dL; all other results were within normal limits including blood urea nitrogen and creatinine. The infant underwent computed tomography (CT) of the head which revealed poor gray white matter differentiation consistent with cerebral edema or hypoxic ischemic injury, left nondisplaced parietal skull fracture with small left subdural hemorrhage, and possible hemorrhage along the interhemispheric fissure raising the concern for abusive head trauma.

The patient was admitted to the PICU intubated and mechanically ventilated. Admission vital signs were as follows: blood pressure 137/109, heart rate 172, temperature 32.1°C , respirations 34 (on mechanical ventilation), and SpO_2 100%. Physical examination demonstrated fixed and dilated pupils, no corneal reflex, no cough or gag reflex, no spontaneous respirations, and no movement to noxious stimuli other than minimal extremity movement that was consistent with spinal reflexes. The neurosurgical service was consulted and determined that the skull fracture and subdural hemorrhage did not require surgical intervention. Due to the global nature of the ischemic injury demonstrated on CT, the neurosurgical service determined intracranial pressure monitoring was not indicated. An arterial line and central venous catheter were placed. An echocardiogram was performed and revealed mildly reduced left ventricular function and a 2.5-mm patent foramen ovale with left to right shunting with no pericardial effusion. His cardiopulmonary circulation was able to be maintained through the use of mechanical ventilation. He initially required no vasoactive infusions. A neuroprotective strategy for electrolyte, blood pressure, and blood gas management was employed. On admission, the social work service, pediatric forensic medicine service, child protective services, and the local police department were all contacted regarding the concern for inflicted trauma.

On hospital day 2, a brain death examination was performed by the attending PICU physician. The physical examination was consistent with brain death, including no spontaneous respirations on apnea testing despite 16 minutes of observation and an increase in $p\text{CO}_2$ from 47 to 172 mm Hg. On the same day, the child's father was taken into police custody and charged with criminal abuse. The child's mother was allowed to continue unlimited visitation with the infant. As per hospital policy, a child of this age requires two separate brain death examinations, by two attending physicians separated by at least 12 hours. A second clinical examination was scheduled for 12 hours later. However, this examination was delayed out of respect to the mother, who had no family members or support system

living within the United States. On hospital day 3, while waiting for the infant's grandmother to arrive from out of state, the infant required the initiation of an epinephrine infusion due to hypotension. On hospital day 4, a repeat CT scan of the head as well as a skeletal survey were performed. The head CT revealed again the left parietal skull fracture, minimal subdural hematoma, loss of gray white differentiation with loss of sulci, and obliteration of the ventricles and basal cisterns concerning for diffuse brain edema. The bone survey performed on hospital day 4 revealed left parietal bone fracture, sutural diastases consistent with cerebral edema, and fractures on the right third, fourth, and fifth ribs, as well as the left fourth and fifth ribs.

A second brain death examination was performed on hospital day 4 by two additional PICU physicians and was consistent with brain death, including a total apnea time of 16 minutes and a change in $p\text{CO}_2$ from 42 to 86. The patient was declared dead on hospital day 4 at 10:30 am. The patient's declaration of death was disclosed to the mother. She was informed that artificial mechanical respiratory and circulatory support would be discontinued, consistent with the patient's diagnosis of death. In accordance with policy, the patient was referred to the coroner's office and the police updated regarding the change in status.

Shortly following the declaration of death on hospital day 4, the hospital received a temporary restraining order (TRO) stating that artificial cardiorespiratory support could not be removed despite the declaration of death and the hospital's position that it was under no legal obligation to continue artificial cardiopulmonary support. The issue was brought before the court on hospital day 5 and the TRO dissolved, under the agreement that the hospital would continue support of the infant's body while the family appointed a physician of their choice to perform an independent examination. On the same day, the infant developed diabetes insipidus requiring a vasopressin infusion. A pediatric neurologist performed an independent examination of the infant and also determined the patient met the clinical criteria for brain death. The court appointed a guardian ad litem (a court-appointed guardian that represents the interests of infants or incompetent persons in legal actions) for the infant on hospital day 10.

Over the course of hospital days 5 to 10, the infant's cardiorespiratory status worsened, requiring considerable support to maintain normal blood pressure and oxygenation. He required escalating ventilator support for hypoxia related to atelectasis and mucous plugging. He required escalating doses of epinephrine, vasopressin, and support of critical endocrine functions including the administration of levothyroxine, hydrocortisone, and fludrocortisone.

On hospital day 12, the hospital presented to the court an emergency motion, stating the infant's cardiorespiratory status was becoming increasingly unstable, requiring considerable resources to maintain, and requested permission of the court to remove cardiorespiratory support. On hospital day 14, a physician chosen by the infant's mother performed another examination and determined the child met criteria for brain death. All parties met before the court on hospital day 16.

The hospital argued that the infant met the definition of death and sought an order to remove artificial cardiorespiratory support. The family argued that the child's parental rights had not been terminated and therefore all medical management decisions were still under their ultimate authority. The guardian ad litem agreed with this position. The hospital countered that because the infant was dead, there were no decisions to be made. Ultimately, on hospital day 25, the judge ruled in favor of the hospital, and issued an order stating the hospital and members of the medical staff had no legal obligation to artificially maintain respiration and circulation. Further, the judge stated the infant met the legal and medical definition of death, upheld by state law, and had so since hospital day 4. Mechanical ventilation was discontinued and the death certificate reflected the date of death to be 21 days earlier, on hospital day 4.

Discussion

Described above is the case of an infant whose declaration of death was contested by his family. This resulted in a legal battle in which a judge ultimately ruled in favor of the treating physicians. However, this ruling happened after a considerable length of time, during which the respiratory and cardiovascular functions of the infant became increasingly difficult to maintain.

This case illustrates several issues that may arise when the declaration of death is contested. In the article, *Ethics and Pediatric Brain Death: Recent Controversy and Practical Suggestions*, by Bibler, Galbraith and Brothers, included in this issue, the authors discuss that medical professionals are not obligated to continue postmortem therapies at the request of the family, and to do so, may harm the dignity of the child and violate his or her privacy. Flamm et al describe a series of 13 patients at one institution whose families requested continuation of physiologic support after the declaration of brain death had been made.⁶ This article touches on the personal and organizational ethics of caring for a brain-dead patient, issues that are germane to the case described above. In this article, clinicians expressed a sense of deep moral harm and loss of professional integrity in continuing therapies in the most extreme example of medical futility.⁶ Organizations are called to question the allocation of resources, including intensive care unit beds, medications, financial burden, and the time and skills of health care professionals in continuing physiologic support of the brain-dead patient.⁶ Unique to the case described is

the additional issue of the motives of a family who has a legal interest in the outcome of the child. The infant's father in our case was initially charged with criminal abuse but subsequently came to face a charge of murder.

Conclusion

The declaration of brain death is a legal definition of death that is upheld in all 50 states in the United States. Nonetheless, the declaration of death based on cessation of neurologic functioning can be difficult for families to comprehend and may lead to futile continuation of therapies when contested. In this report, the case of an infant pronounced dead by neurologic criteria was reviewed. When the removal of physiologic support is delayed, this can result in a considerable moral burden for health care workers and the futile allocation of limited health care resources.

Conflict of Interest

None.

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