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Magnetic Resonance Imaging of Brain Death

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Fifteen patients with clinical diagnosis of brain death were examined by magnetic resonance (MR) imaging. Aortography with intraarterial digital subtraction angiography (IADSA) was also performed in nine patients. MR imaging indications of the flow void phenomenon were evaluated in the cavernous portion of internal carotid artery (ICA) and the middle or anterior cerebral artery, and compared with the IADSA findings. The relative intensities of gray and white matters were also measured. MR imaging showed that flow voids were absent in the ICA in all eight patients in whom non-filling was confirmed by IADSA. In one patient, IADSA demonstrated intracranial flow despite the diagnosis of brain death and the flow void pattern was normal. Serial MR imaging showed disappearance or abnormality of flow voids after brain death in six patients and absence before brain death in one. Spotty flow voids became visible in the unilateral ICA of one case after brain death. Partial residual flow voids may be caused by to-and-fro blood movement which was demonstrated by transcranial Doppler sonography. The normal flow void pattern was seen in none of these patients, therefore absence of flow voids indicates cessation of intracranial blood flow. Proton density and T₂-weighted MR images showed dissociated intensity changes between white and gray matters, which were thought to be characteristic of brain death. In conclusion, MR imaging can achieve non-invasive diagnosis of the non-filling phenomenon in patients with brain death.

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OBJECTIVE: To demonstrate the magnetic resonance imaging (MRI) appearance of the brain in patients with clinical brain death. **PATIENTS AND METHODS:** High-field (1.5-T) MRI was performed on five patients who were subsequently proven clinically brain dead. Conventional T1-weighted and T2-weighted imaging was performed. **RESULTS:** MRI exhibited similar features for all of the patients: loss of the subarachnoid spaces of the brain; slow flow in the intracavernous and cervical internal carotid arteries; and loss of flow void in the small and large intracranial arteries, as well as in the major intracranial arteries. Fifteen patients with clinical diagnosis of brain death were examined by magnetic resonance (MR) imaging. Aortography with intraarterial digital subtraction angiography (IADSA) was also performed in nine patients. MR imaging indications of the flow void phenomenon were evaluated in the cavernous portion of internal carotid artery (ICA) and the middle or anterior cerebral artery, and compared with the IADSA findings. The relative intensities of gray and white matters were also measured. MR imaging showed that flow voids were absent in the ICA in all eight patients in whom non-filling was confirmed. Most imaging tests for brain death rely on the absence of cerebral blood flow as a surrogate for brain death. This can be assessed by a number of modalities including CT, MRI, ultrasound, nuclear medicine examinations, and catheter angiography. It is important to note that not all modalities and examinations are approved for the legal determination of brain death and that this will vary from country to country. Ultrasound. reverberant or oscillating flow in the MCA vessels has been reported 8.