Brief Communication

Computerized Axial Tomography in Brain Death

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SUMMARY Two patients with the diagnosis of brain death were evaluated with computerized axial tomography (CAT). After intravenous infusion of 30% Conray there was no visualization of the intracranial vasculature (circle of Willis). The second patient also had an isoelectric EEG. A third patient with an intracerebral lesion similar to the other cases but without diagnosis of brain death, showed good visualization of the circle of Willis. Therefore, contrast-enhanced CAT scans can be used as another diagnostic aid to confirm brain death.

AN ISOELECTRIC electroencephalogram is one of the means by which brain death is confirmed. Lack of cerebral artery perfusion at arteriography has also been recognized as a neurodiagnostic sign of brain death. In the following 2 cases the lack of cerebral artery perfusion on contrast-enhanced computerized axial tomography (CAT) scan also confirmed brain death.

Patient 1
A 75-year-old hypertensive woman experienced a severe headache associated with vomiting 30 minutes prior to becoming unconscious. Blood pressure was 210/120, pulse 60/min. Brain stem reflexes were absent. The patient was flaccid and unresponsive to all stimuli. Supportive respiratory devices were used for 30 minutes after the patient went into respiratory arrest. An isoelectric electroencephalogram was recorded the following day and CAT scanning was performed after infusion of 300 ml of 30% Conray at the rate of 25 ml/min for the first 6 minutes and 12 ml/min for the next 12. The first horizontal cut, designed to transect the circle of Willis, was scanned after 150 cc had been infused. The preinfusion scan revealed an extensive thalamic hemorrhage with intraventricular extension.

The contrast-enhanced scan confirmed this but failed to visualize the circle of Willis (fig. 1).

Patient 2
A 47-year-old male complained of severe headache on the morning of hospital admission. BP was 170/90, pulse 80/min. He was semicomatose and responsive to painful stimuli only. Right hemiparesis was evident. There was nuchal rigidity. A spinal tap revealed CSF pressure of 450 mm of water and bloody spinal fluid.

Left carotid arteriography demonstrated a left temporal avascular mass interpreted as a hematoma. An aneurysm at the junction of the internal carotid and the posterior communicating artery was demonstrated. On the third day the aneurysm was clipped. However, the patient deteriorated postoperatively and spontaneous respirations ceased on the fourth day.

An isoelectric electroencephalogram was recorded and on the sixth day CAT scanning, after infusion of contrast, confirmed the intracerebral hematoma but no filling of the vessels of the circle of Willis (fig. 2).

FIGURE 1. Contrast-enhanced scan (patient 1) confirms thalamic hemorrhage with intraventricular extension but fails to visualize circle of Willis.
Patient 3

In comparison, a third patient with hypertension and intracerebral hemorrhage, without evidence of brain death, underwent CAT scanning with contrast and the circle of Willis was visualized (fig. 3).

In our series of CAT scans with contrast, 90 to 95% of the patients demonstrated the vessels of the circle of Willis, using 300 ml of 30% Conray 25 ml/min for the first 6 min and 12 ml/min for the next 12.

Contrast-enhanced CAT can be used as another means to confirm brain death.
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