

Computed tomography angiography for brain death

The available [evidence](#) cannot support the use of [CT angiography](#) as a mandatory test, or as a complete replacement for neurological testing, in the management pathway of patients who are suspected to be clinically brain dead. CT angiography may be useful as a confirmatory or add-on test following a clinical diagnosis of death, assuming that clinicians are aware of the relatively low overall sensitivity. Consensus on a standard radiological interpretation protocol for future published studies would facilitate further meta-analysis ¹⁾.

In clinical practice catheter [cerebral angiography](#), perfusion scintigraphy, [transcranial Doppler sonography](#), CT angiography and MR angiography are used. Other methods, like perfusion CT, xenon CT, MR spectroscopy, diffusion weighted MRI and functional MRI are being studied as potentially useful in the diagnosis of brain death. CT angiography has recently attracted attention as a promising alternative to catheter angiography - a reference test in the diagnosis of brain death. Since 1998 several major studies were published and national guidelines were introduced in several countries (e.g. in France, Austria, Switzerland, the Netherlands and Canada) ²⁾.

Determining [brain death](#) using computed tomography angiography ³⁾.

Case series

2015

CT angiography examinations of 25 patients with a clinical diagnosis of brain death were reevaluated according to 10-, 7-, and 4-point scales. Exams were performed with a 64-slice CT scanner including unenhanced, arterial (20 s) and venous phase (60 s) scans. Subtraction images of both phases were obtained. Interobserver agreement was evaluated for the assessment of vessel opacification and diagnosis of brain death. RESULTS:

According to 10-, 7-, and 4-point scales; 13, 16, and 22 of 25 patients had full score, respectively. Using the clinical exam as the reference standard, sensitivities obtained for 10-, 7-, and 4-point scales were 52%, 64%, and 88%, respectively. Percent agreement between readers was 100% for 10- and 7-point scales and 88% for 4-point scale. Percent agreement for opacification of scale vessels was equally high for all three scales (93.6%, 93.7%, 91% for 10-, 7-, and 4-point scales, respectively).

The 4-point scale appears to be more sensitive than the 10- and 7-point scales in CT angiography evaluation for brain death. Interobserver agreement is high for all three scales when subtraction images are used ⁴⁾.

2014

Fourteen brain death cases diagnosed in Mart 2012-May 2013 period in Tokat State Hospital were studied retrospectively. CT angiography experience about those cases was shared, and use of CT angiography in confirmation of brain death was discussed.

All 14 cases were patients on mechanical ventilator, who did not respond to medical and surgical treatments at intensive care unit and were diagnosed clinically with brain death. All of these patients

had CT angiography as a confirmatory test using a 4-slice CT scanner in Radiology department in Tokat State Hospital.

Six of the patients were female and eight were male. All of them were referred from intensive care unit and had clinical brain death diagnosis before CT angiography. In the evaluation of CTA, four-point scoring involving opacification loss in both ICVs and cortical segments of MCA was used. CTA examinations confirmed brain death diagnoses in all patients who had clinical brain death diagnoses, and no confliction between CTA findings and clinical diagnoses was observed.

Demonstrating the lack of cerebral circulation is a necessity for confirmation of brain death diagnosis. While conventional angiography remains the standard method, CTA emerged as an alternative method. In parallel to increase in prevalence of organ implants, CTA, a fast and efficient method, has been increasingly used in confirmation of brain death diagnoses ⁵⁾.

1)

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2)

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3)

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4)

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5)

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