

Computed tomography angiography for subarachnoid hemorrhage

[Computed tomography angiography](#) is slowly replacing [digital subtraction angiography](#) as the first-line technique for the diagnosis and treatment planning of [intracranial aneurysms](#), but digital subtraction angiography is still required in patients with diffuse [subarachnoid hemorrhage](#) (SAH) and negative initial computed tomography angiography ¹.

[Computed tomography angiography](#) (CTA) is increasingly used for the detection, characterization, and follow-up of [intracranial aneurysms](#).

A lower threshold to request a CT angiogram may render a patient population that differs from previous studies primarily evaluated with conventional [angiography](#).

All CTA studies performed over a 10-year period at a large neurovascular referral center were reviewed for the presence of an [intracranial aneurysm](#). Patient demographics, mortality, CTA indication, aneurysm location, size, and rupture status were recorded.

2927 patients with aneurysms were identified among 29 003 CTAs. 17% of the aneurysms were ruptured at the time of imaging, 24% of aneurysms were incidentally identified, and multiple aneurysms were identified in 34% of patients. Aneurysms most commonly arose from the supraclinoid internal carotid artery (22%), the middle cerebral artery (18%), and the anterior communicating artery (13%). Male sex, age <50 years, aneurysms >6 mm, and aneurysms arising from the anterior communicating artery, posterior communicating artery, or the posterior circulation were independent predictors of aneurysm rupture. Independent mortality predictors included male sex, posterior circulation aneurysms, intraventricular hemorrhage, and intraparenchymal hemorrhage.

These results indicate that aneurysms detected on CTA that arise from the [anterior communicating artery](#), [posterior communicating artery](#), or the [posterior circulation](#), measure >6 mm in size, occur in men, and in patients aged <50 years are associated with rupture.

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DSA identifies vascular pathology in 13% of patients with CTA-negative SAH. Aneurysms or pseudoaneurysms are identified in an additional 4% of patients by repeat DSA following an initially negative DSA. All patients with CT-negative SAH should be considered for DSA. The pattern of SAH may suggest the cause of hemorrhage, and aneurysms should specifically be sought with diffuse or [perimesencephalic subarachnoid hemorrhage](#) ³⁾.

Bone-subtraction CTA is as accurate as DSA in detecting cerebral aneurysms after SAH, provides similar information about aneurysm configuration and measures, and reduces the average effective radiation dose for vascular diagnostics by 65%. Diagnostic equivalence in association with dose reduction suggests replacing DSA with bone-subtraction CTA in the diagnostic work-up of spontaneous SAH ⁴⁾.

In view of the aggressive natural history of [posterior circulation traumatic intracranial aneurysm](#) (TICA), deSouza et al., recommend that CTA of the head and neck vessels be performed for cases presenting with post-traumatic disproportionate [cisternal](#) and or [third ventricle](#) or [fourth ventricle](#) SAH. In the event of initial CTA being negative, repeat CTA and if negative DSA should be performed between 5 to 7 days, with a low threshold for further repeat at 10 days if a traumatic dissection is still suspected. Close monitoring for [hydrocephalus](#) and [vasospasm](#) is required during hospital admission and significant therapy input is likely to be required post discharge from acute care ⁵⁾.

1)

de Oliveira Manoel AL, Mansur A, Murphy A, Turkel-Parrella D, Macdonald M, Macdonald RL, Montanera W, Marotta TR, Bharatha A, Effendi K, Schweizer TA. Aneurysmal subarachnoid haemorrhage from a neuroimaging perspective. Crit Care. 2014 Nov 13;18(6):557. doi: 10.1186/s13054-014-0557-2. Review. PubMed PMID: 25673429; PubMed Central PMCID: PMC4331293.

2)

Heit JJ, Gonzalez RG, Sabbag D, Brouwers HB, Ordonez Rubiano EG, Schaefer PW, Hirsch JA, Romero JM. Detection and characterization of intracranial aneurysms: a 10-year multidetector CT angiography experience in a large center. J Neurointerv Surg. 2015 Nov 9. pii: neurintsurg-2015-012082. doi: 10.1136/neurintsurg-2015-012082. [Epub ahead of print] PubMed PMID: 26553878.

3)

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4)

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5)

deSouza RM, Shah M, Koumellis P, Foroughi M. Subarachnoid haemorrhage secondary to traumatic intracranial aneurysm of the posterior cerebral circulation: case series and literature review. Acta Neurochir (Wien). 2016 Sep;158(9):1731-40. doi: 10.1007/s00701-016-2865-6. Epub 2016 Jun 30. Review. PubMed PMID: 27364895; PubMed Central PMCID: PMC4980416.

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