

peer reviewed **CASE REPORT**

## Aneurysmal subarachnoid haemorrhage: a case report of a ruptured anterior communicating artery aneurysm

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### Abstract

This case report discusses a subarachnoid haemorrhage after an anterior communicating artery aneurysm ruptured. The patient's clinical history, the computed tomography angiography findings, the epidemiology of this pathology, and treatment options, are discussed.

### Keywords

CT angiogram

### Case report

A middle-aged male was admitted to a casualty department with a sudden severe headache. He was examined by a neurosurgeon and referred for a computed tomography (CT) brain scan. An unenhanced CT scan of the brain demonstrated a subarachnoid haemorrhage (images not included). There was bleeding in the region of the anterior aspect of the Circle of Willis with haemorrhage into the lateral and third and fourth ventricles. The features were suspicious of a ruptured anterior communicating artery aneurysm. A CT angiogram (CTA) was suggested. This was done a week later. The CTA demonstrated a saccular aneurysm of 8mm x 6.7mm (see Figure 1) related to the right of the anterior communicating artery. The neck of the aneurysm was fairly broad and meas-

ured about 4mm (see Figure 2). The aneurysm was directed anteriorly, superiorly and medially towards the midline. The left anterior cerebral artery does not opacify as well as the right anterior cerebral artery (see Figure 3). No other aneurysms were identified. The intraventricular haematoma in the occipital horns remained stable.

The patient had surgical clipping. He received occupational therapy to better his cognitive skills. His recovery was good and he was able to function normally.

### Discussion

CT is the preferred imaging choice to diagnose subarachnoid haemorrhage. It is readily available, fast and easy to perform. An aneurysm rarely gets defined by unenhanced CT, but an aneurysm wall calcification can be demonstrated.<sup>[1]</sup>

The technique for CTA includes a spiral (preferably multislice) scan with a rapid injection of iodinated contrast media. The scan should extend from the foramen magnum, including the vertebral arteries through the Sylvian fissures. Bolus detection software should be used.<sup>[1]</sup> If this is not available a timed test injection could be used.<sup>[2]</sup> The sensitivity and specificity depend on the aneurysm size, location, the radiologist's experience and how the images are presented.<sup>[1]</sup> CTA has a sensitivity of 77-100% and a specificity of 79-100%. Small aneurysms might be overlooked; they are often mistaken for tortuous vessels. The critical size for detection is 5mm. Size measured with catheter angiography and CTA is similar and correlates with surgical findings.<sup>[1]</sup>

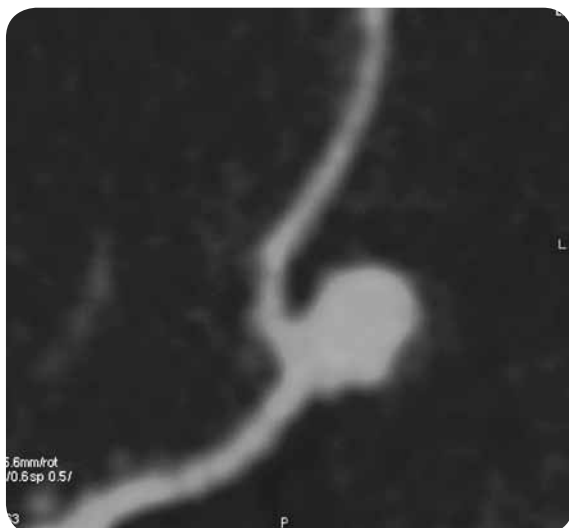


Figure 1. CT curved reformat demonstrating an aneurysm measuring 7.2mm.

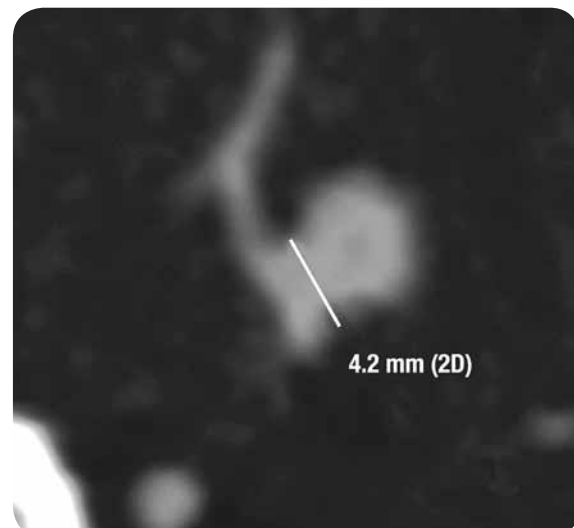
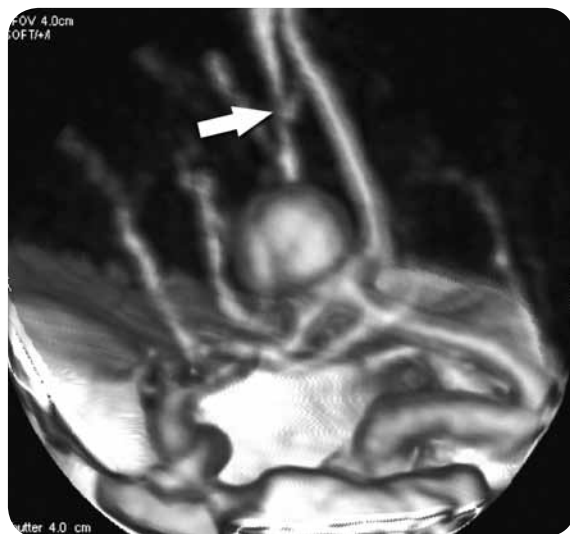


Figure 2. CT curved reformat demonstrating aneurysm neck measuring 4.2mm.



**Figure 3.** A volume rendered CT image of the Circle of Willis demonstrating the aneurysm of the anterior communicating artery. Left cerebral artery (white arrow).

Catheter angiography is used as the gold standard by many authors when evaluating CTA accuracy. There is a 100% correlation between aneurysms detected on CTA and surgical findings. Catheter angiography that followed CTA did not add any more information in 74% of cases.<sup>[1]</sup> Catheter angiography is time consuming, expensive and invasive procedure.<sup>[5]</sup> Often in emergency cases neurosurgeons operate on the basis of the CTA results only. Nevertheless some neurosurgeons are performing surgery on the basis of CTA alone in certain non-emergency cases and only obtain catheter angiography when CTA does not provide the information needed for surgery.<sup>[1,3]</sup> It is suggested that in about 50% of cases, CTA alone is sufficient for surgical clipping.<sup>[1]</sup> CTA alone is a conclusive diagnostic tool to rule out aneurysms in patients presenting with no haemorrhage or the non-aneurysmal perimesencephalic haemorrhage and could replace catheter angiography. However, in all other cases of subarachnoid haemorrhage, if the CTA is negative, catheter angiography is still required.<sup>[2]</sup>

Not only does CTA demonstrate the aneurysm lumen, but also any thrombosis in the aneurysm. The 3D reconstruction may offer a perspective of the aneurysm that more closely approximate the surgical approach than conventional angiography. CTA better displays anatomical detail like an aneurysm neck, vascular relations and bony landmarks.<sup>[1]</sup> CTA is very sensitive for calcification in the aneurysm, this is important because a possible calcification

located at the neck of an aneurysm may present difficulty in surgical clipping.<sup>[4]</sup>

CTA may be used as a tool for therapeutic decision making and therapy planning. Information on the exact dimensions of an aneurysm provided by the CTA can be used to determine the diameter of the first coil.<sup>[3]</sup>

The main advantages of CTA are: the short acquisition time (30-60s) and the rapid study time. Catheter angiography has a longer preparation and examination time. CT, unlike magnetic resonance imaging (MRI), is not hampered by restrictions when selecting patients, such as pacemakers, selected aneurysm clips and neuro-stimulators. Turbulent flow and slow flow that may cause flow artefacts in MRI are usually not observed in CTA.<sup>[1]</sup> CTA does not have the associated risks of morbidity and mortality associated with catheter angiography.<sup>[1,2]</sup> The radiation dose of CTA is more than for a routine cranial scan, but significantly less than for catheter angiography.<sup>[5]</sup>

The major disadvantage of CTA, as in catheter angiography, is iodinated contrast media. The two major risks associated with iodinated contrast media are allergic reactions and renal compromise. Both of these are contra-indications for CTA. Patients with a prior history of allergic reactions can be premedicated with corticosteroids and antihistamine before iodine is administered.<sup>[1]</sup>

The interpretation of CTA might be limited by vascular clippings, intracranial haem-

orrhage and vascular intramural calcifications. However, 3D reconstruction may minimize the artefact that is associated with calcification. Similarly, attenuation of the vascular contrast is typically higher than that of haemorrhage, so it usually does not interfere with CTA. Post-operative assessment of aneurysms is limited by aneurysm clips, as they have a similar attenuation as that of vascular contrast.<sup>[1]</sup>

## Conclusion

CT is the preferred imaging choice to diagnose subarachnoid haemorrhage. It is readily available, fast and easy to perform. Although an aneurysm is rarely demonstrated on an unenhanced CT, aneurysm wall calcifications are demonstrated.<sup>[1]</sup> CTA is a highly sensitive, non-invasive imaging method for diagnosis and evaluation of aneurysm in cases with acute subarachnoid haemorrhage with suspected intracranial aneurysms.<sup>[5]</sup> Early diagnosis and anatomical characterization of ruptured aneurysms is very important.

## References

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