IMAGE OF THE MOMENT

3D catheter

A 42-year-old woman presented with a classical history of a subarachnoid haemorrhage. An initial CT brain scan showed diffuse subarachnoid blood, equally distributed in Sylvian fissures and in the interhemispheric fissure. Two conventional cerebral angiograms had been performed and showed no aneurysm. In view of her age, clinical presentation and CT findings, a further catheter angiogram was performed, which showed a slight bulkiness at the left middle cerebral artery bifurcation (Fig. 1). However, the 3D angiogram revealed a definite middle cerebral artery aneurysm, measuring only 2 mm in size (Fig. 2). This was successfully treated with endovascular coiling.

Ruptured intracranial aneurysms have a significant re-bleeding risk of 15–20% in the first 2 weeks. Therefore, early confirmation of an aneurysm facilitates prompt treatment and catheter angiography remains the gold standard technique. But in recent years, three-dimensional rotational angiography has revolutionized catheter angiography. This technique involves selective carotid catheterization, and a timed bolus injection of 15 mL of contrast coupled with 180° rotation of the image intensifier. A 3D image is reconstructed within 3 mins and can be manipulated in any plane. Some of the uses of this technique are listed in the table.

3D angiography is very useful in neurointervention, especially in aneurysm coiling. Firstly, complicated tortuous anatomy can be unravelled (Figs 3 and 4). Then by rotating the image in 3D, any important branches incorporated at the base of the aneurysm can be identified. Next the neck size is assessed to see if any balloon remodelling or neck stenting technique is required. And finally the projection that best delineates the relationship of the neck to the parent vessel is selected for coiling, and then an appropriate coil can be chosen for the 3D aneurysm shape. All these decisions can be made more accurately, faster and with greater confidence.

3D catheter angiography reduces examination time and radiation dose in complicated cases, increases confidence in diagnosis and is a very useful tool in neurointerventional radiology, making treatment safer.

Figure 1 2D conventional catheter angiogram showed slight bulkiness (arrow) at the middle cerebral artery (MCA) bifurcation.

Figure 2 3D angiogram clearly demonstrates a 2 mm MCA aneurysm suitable for coiling.

angiography

USES OF 3D ANGIOGRAPHY

- To identify small aneurysms.
- To sort out complex anatomy (Figs 3 and 4).
- To exclude aneurysms that cannot be coiled.
- To establish relationship of branch vessel origin to neck of aneurysm.
- To assess neck size and dome/neck ratio.
- To find the correct coiling angle.
- To assess shape and to select the crucial first coil.
- To assess recurrence post coiling/follow up angiography.
- Arteriovenous malformations.

Figure 3 Lateral 2D catheter angiogram shows a large complicated cavernous carotid aneurysm, probably with a wide neck.

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Figure 4 3D reconstruction shows a large cavernous carotid aneurysm (large arrow) with a narrow neck, and an additional smaller carotid cavernous aneurysm (small arrow) which was not appreciated on the standard 2D biplanar angiogram.