

# Endovascular Coiling of Intracranial Aneurysms

By Prof. Dr. Roberto Gasparotti and Dr. Marco Pavia

Until recently, the standard method of treatment for intracranial aneurysms has been surgical clipping. However, in the last decade, the introduction of Guglielmi detachable coils has completely revolutionized the therapeutic management of patients with intracranial aneurysms. Since the publication of the ISAT study, the only randomized trial that compared endovascular coiling with surgical clipping in ruptured aneurysms, the overall number of treatments has progressively increased in interventional neuroradiology units. With the improvement of non-invasive imaging techniques, the detection rate of asymptomatic unruptured aneurysms has also increased, thus creating a need for adequate anatomic images for endovascular decision-making in order to carefully balance the risk of treatment against the risk of rupture.

When installed in the radiology department of the Spedali Civili di Brescia on January 2006, the AXIOM Artis *dBA* was the first biplane flat detector neuroangiography system in Italy. Since the installation, 90 intracranial aneurysms have been treated in 85 consecutive patients. In our practice ruptured aneurysms are first identified at admission, with plain CT, immediately followed by CT angiography. Intra-arterial digital subtraction angiography (IADSA) is performed once the endovascular treatment has been planned as the first therapeutic option. Therefore the diagnostic part of the examination usually takes place right before the endovascular treatment, with the patient under general anaesthesia.

The AXIOM Artis *dBA* has completely changed our approach to the endovascu-

lar treatment of intracranial aneurysms. In every patient a 3D rotational angiography is performed in order to obtain an accurate assessment of the aneurysm's size, shape and anatomical relationship with adjacent vessels. The *syngo* Multimodality Workplace, with the *syngo* InSpace 3D application, allows a quick reconstruction of the 3D rotational angiography dataset with an interactive 3D visualization of the aneurysms in the exam room, and automatically adjusts the C-arm of AXIOM Artis system synchronously to the movement of the 3D reconstruction. The best working projection can therefore be found more rapidly, for more efficient aneurysm coiling, with an overall reduction of the dose for the patient.

The pre-therapeutic evaluation includes an initial *syngo* InSpace 3D reconstruction with 3D measurements of the aneurysm neck and the largest depth and width of the dome in different projections, which are particularly useful in aneurysms with a complex shape, in order to select the best endovascular approach (coils, stent-assisted coiling or balloon-assisted coiling). These measurements are usually performed on translucent VRT renderings and facilitate the selection of the first coil, whose diameter is chosen according to the largest width of the aneurysm and to the neck size.

Another interesting feature of the AXIOM Artis *dBA* is the *syngo* DynaCT application, which represents a useful tool especially during the treatment of small, irregular ruptured aneurysms which are at risk of re-rupture during the procedure. In case of intra-procedural bleeding of the aneurysm, CT-like images displaying the

size of subarachnoid haemorrhage, the size of an intraparenchymal haematoma and the size of the ventricles, allow quick therapeutic decisions that have a dramatic impact on the outcome of patients. We always try to perform a *syngo* InSpace 3D reconstruction at the end of the procedure when we realize treatment was suboptimal. The *syngo* InSpace 3D dual-volume reconstruction is very helpful in defining the aneurysm remnant after coiling.

Since the beginning of our experience with AXIOM Artis *dBA*, we have been able to treat complex aneurysms, such as MCA aneurysms, which are less suitable for coiling because the secondary branches are close to the neck of the aneurysm. We have observed an overall trend towards a higher rate of complete occlusion and a reduced complication rate in the treatment of intracranial aneurysms.

## References

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“The AXIOM Artis dBA has completely changed our approach to the endovascular treatment of intracranial aneurysms.”

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Prof. Roberto Gasparotti (right) and Dr. Marco Pavia in front of the AXIOM Artis dBA