

ANGIOGRAPHIC IMAGING AND 3D RECONSTRUCTION OF A GIANT INTERNAL CAROTID ARTERY ANEURYSM

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ABSTRACT

Unruptured intracranial aneurysms are diagnosed with increased frequency as cerebral imaging techniques are more easily available. In spite of this, there is still no standardized approach to the patient with such pathology. We present the case of a 56-year-old woman presenting with ongoing headaches, who had a giant unruptured intracranial aneurysm of the left internal carotid artery.

Key words: unruptured intracranial aneurysm, angiography, 3D reconstruction.

BACKGROUND

The word „aneurysm“ comes from the Latin word *aneurysma*, which means dilatation. An aneurysm is a localized abnormal dilation of a blood vessel, usually an artery, caused by weakness of the vessel wall which may eventually rupture resulting in hemorrhage (1). Intracranial aneurysms are common, with a prevalence of 0.5% to 6% in adults, according to angiography and autopsy studies (2). An aneurysm may be congenital or may arise from other causes, such as hemodynamically induced or degenerative vascular injury, atherosclerosis, underlying vasculopathy, and high-flow states.

The majority of intracranial aneurysms is asymptomatic and is never detected. Some aneurysms are discovered incidentally in neuroimaging studies and some produce symptoms by compressing neighboring brain tissue or adjacent

nerves. Others are detected only after they have ruptured and caused subarachnoid hemorrhage, a condition associated with a 30-day mortality rate of 45% and with 10% to 20% long-term dependence in survivors due to brain damage (3, 4) The natural history and treatment outcomes of unruptured intracranial aneurysms are not yet very well documented and therefore the management of this condition remains controversial (5). However, from previous data it was concluded that the natural history as well as the treatment outcomes are influenced by:

- *patient factors*, such as age, gender, coexisting medical conditions and previous aneurismal subarachnoid hemorrhage;
- *aneurysm characteristics*, such as size, morphology and location;
- *factors in management*, such as the experience of the surgical team and the treating hospital (6).

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Unruptured intracranial aneurysms are diagnosed with increasing frequency as cerebral imaging techniques improve and are applied more commonly and are generally treated electively. The following are three options of treating intracranial aneurysms:

- observation;
- craniotomy and clipping;
- endovascular coiling.

The International Study of Unruptured Intracranial Aneurysms (ISUIA) aimed to assess the natural history of unruptured aneurysms and to measure the risk associated with their treatment. The results showed that for unruptured aneurysms in the internal carotid, anterior communicating, anterior cerebral, and middle cerebral arteries, the five-year rupture rate of lesions with diameters of 7 to 12 mm was 2.6 percent; lesions 13 to 24 mm in diameter had a 14.5 percent rupture rate; and lesions with diameters greater than 24 mm had a 40 percent rupture rate (7). The Trial on Endovascular Aneurysm Management (TEAM) is a randomized trial whose main goal is to determine which treatment strategy to adopt when an intracranial aneurysm is incidentally discovered on imaging studies of the brain (8). The TEAM trial considers only the endovascular versus the conservative management. Unfortunately, due to controversy in the neurosurgical community, no surgical clipping group is being included in the study (5).

At the moment, a decision to treat is individualized and should be made by a physician or physicians who are capable of offering both types of treatment, clipping or coiling, without bias.

CASE STUDY

We report the case of a 56-year-old Caucasian woman, who was admitted to the Neurology Department of the Emergency University Hospital for ongoing headaches during the past 10 years. The patient, who had had sixteen deliveries, was hypertensive, but followed no treatment prior to hospitalization. Two weeks before admission the patient had undergone a magnetic resonance examination of the brain which showed an aneurismal dilatation of 17/13 mm, localized in the distal part of the left internal carotid artery and the proximal part of the left middle cerebral artery.

On hospital admission the patient was alert, the clinical examination revealed no fever, a blood pressure value of 190/120 mmHg, rhythmic heart beats and no abnormal neurological signs. The laboratory tests were in normal range. During the

hospitalization period an angiographic examination of the cerebral arteries was performed. It revealed a giant saccular aneurysm oriented postero-superiorly and localized on the left internal carotid artery, before the emergence of the left middle cerebral artery (fig. 1).

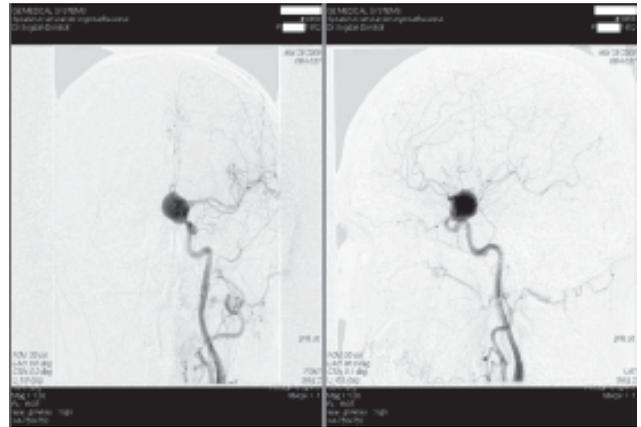


Figure 1. Angiographic images of the left internal carotid artery aneurysm.

Through 3D reconstruction techniques, the aneurysm was found to have a maximum diameter of 20.5 mm (fig. 2). Its location and dimensions were consistent with the history of headaches the patient had. These headaches were most probably caused by the mass effect the aneurysm exerted on the neighboring nervous tissue.

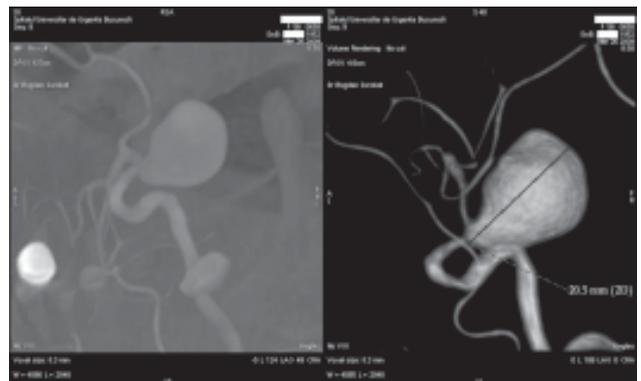


Figure 2. Measuring the dimension of the aneurysm using 3D reconstruction techniques.

The team of physicians assigned to this case (neurologists, interventional radiologists and neurosurgeons) unanimously agreed that, considering the dimensions of the aneurysm and the age of the patient (patient age of over 50 years old pleads against interventional therapy), the best course of action in this case is the conservative approach doubled by the appropriate control of the blood pressure values which constitute a major risk factor for the aneurismal rupture.

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