Intracranial fusiform aneurysm

- Safety and Effect of Flow Diverters in the Management of Large and Giant Unruptured Intracranial Aneurysms
- Illustrated step-by-step guide to stent-assisted coiling of wide-neck posterior inferior cerebellar aneurysm via a contralateral vertebral artery approach
- Elevated Expression of TGFB1 in PBMCs Is Associated with Intracranial Aneurysm Formation, but TGFB3 Expression Implicated Rupture
- THSD1 Is a Multifaceted Regulator in Health and Disease
- Worthwhile or Not? The Pain-Gain Ratio of Screening Routine cMRIs in a Maximum Care University Hospital for Incidental Intracranial Aneurysms Using Artificial Intelligence
- Non-Saccular Aneurysm Shape as a Poor Prognostic Factor in Younger Patients with Spontaneous Subarachnoid Hemorrhage
- Histological Analysis of Intracranial Cerebral Arteries for Elastin Thickness, Wall Thickness, and Vessel Diameters: An Atlas for Computational Modeling and a Proposed Predictive Multivariable Model of Elastin Thickness
- Risk Factors for Unfavorable Angiographic Outcomes after Reconstructive Endovascular Treatments of Unruptured Vertebral Artery Dissecting Aneurysms

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Fusiform aneurysms are nonsaccular dilatations that involve the vessel wall for a variable distance and they can present different formation process [1)]

An **intracranial fusiform aneurysm** is a type of aneurysm that occurs in the arteries within the brain. It is characterized by a gradual, uniform dilation of the arterial wall, which results in a spindle or fusiform (spindle-shaped) appearance. Unlike the more common saccular aneurysms, which have a localized sac or pouch that bulges out from the artery wall, fusiform aneurysms involve a more diffuse, elongated enlargement of the entire circumference of the artery.

Key characteristics of a fusiform aneurysm: - **Shape**: It has a spindle or fusiform shape, meaning it is elongated and symmetric, unlike the round sac of a typical saccular aneurysm. - **Location**: Fusiform aneurysms are often found in the larger arteries, particularly the basilar artery or vertebral arteries, but they can occur anywhere in the intracranial circulation. - **Etiology**: The exact cause is not always clear, but they are generally associated with conditions that weaken the arterial wall, such as atherosclerosis, hypertension, or connective tissue disorders like Ehlers-Danlos syndrome. - **Symptoms**: Depending on their size and location, fusiform aneurysms may be asymptomatic or cause neurological symptoms such as headaches, cranial nerve deficits, or even strokes. Larger aneurysms may compress surrounding structures, leading to additional symptoms. - **Management**: Treatment options depend on the size, location, and symptoms caused by the aneurysm. If the aneurysm is causing significant problems or is at risk of rupture, interventions like surgical clipping, endovascular coiling, or stent-assisted coiling may be considered. In some cases, conservative management is appropriate, especially for smaller or asymptomatic aneurysms.

Given their complexity, fusiform aneurysms often require careful monitoring and a multidisciplinary approach, including imaging studies like MRI or CT angiography to assess their size, shape, and impact on surrounding brain structures.

Epidemiology

Intracranial fusiform aneurysms are rare, although the number of cases has increased in recent years, mainly in young patients [2)]

Classification

Intracranial fusiform aneurysms are rare and account for 3-13% of all intracranial aneurysms and are more common in the vertebrobasilar system.

Fusiform vertebrobasilar aneurysm

Fusiform anterior cerebral artery aneurysm

Fusiform middle cerebral artery aneurysm are still rarer.

Fusiform internal carotid artery aneurysm.

To improve the understanding of FIA hemodynamics, a pilot study contains morphological analyses and image-based blood flow simulations in three patient-specific cases. For a precise and realistic comparison to the pre-pathological state, each dilation was manually removed and the time-dependent blood flow simulations were repeated. Additionally, a validated fast virtual stenting approach was applied to evaluate the effect of virtual endovascular flow-diverter deployment focusing on relevant hemodynamic quantities. For two of the three patients, post-interventional information was available and included in the analysis. The results of this numerical pilot study indicate that complex flow structures, i.e., helical flow phenomena and the presence of high oscillating flow features, predominantly occur in FIAs with morphologically differing appearances. Due to the investigation of the individual healthy states, the original flow environment could be restored which serves as a reference for the virtual treatment target. It was shown that the realistic deployment led to a considerable stabilization of the individual hemodynamics in all cases. Furthermore, a quantification of the stent-induced therapy effect became feasible for the treating physician. The results of the morphological and hemodynamic analyses in this pilot study show that virtual stenting can be used in FIAs to quantify the effect of the planned endovascular treatment [3)].

Rupture risk

Pure fusiform aneurysms and not dissecting aneurysm are considered to have a low rupture risk. Furthermore, aneurysm wall with atherosclerotic change tends to be less susceptible to rupture.

Treatment

Intracranial fusiform aneurysm treatment.

Case reports

Oshio et al. present a rare case of multiple atherosclerotic fusiform aneurysms associated with repeated subarachnoid hemorrhage(SAH)during a 9-year observation period. A 34-year-old woman was admitted to our hospital because of SAH. SAH with a temporal hematoma due to a fusiform aneurysm of the right middle cerebral artery(MCA)was detected using computed tomography(CT). Associated fusiform aneurysms were observed in the left posterior cerebral artery(PCA)and the left MCA. The right MCA aneurysm was occluded with angioplastic clipping. Eight years after the first onset, angioplastic clipping was performed on the other two fusiform aneurysms because of their growth. Intraoperative findings showed atherosclerotic change in the parent artery wall, similar to the right MCA aneurysms. The right MCA aneurysm ruptured again 1 year later. The aneurysm was treated with proximal occlusion combined with a bypass from the occipital artery to the distal MCA. The patient was in a stable state, although, she was disabled because of SAH damage. The effects of atherosclerotic fusiform aneurysms, which are rarely encountered, are not well known. Some studies have reported the risk of hemorrhage from these aneurysms. This case suggests the necessity of long-term follow-up for the prediction of aneurysm growth and bleeding. Moreover, proximal occlusion combined with an external bypass is better for the treatment of this type of aneurysm because angioplastic clipping is not curative [4].

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