Giant serpentine aneurysm

A serpentine aneurysm has been defined as a giant, partially thrombosed aneurysm (greater than 2.5 cm in diameter), with tortuous vascular channels that have a separate entrance and outflow pathway [1)]

The channels may be central or eccentric within the aneurysm, with small branching channels that end blindly. Vascular flow, which supplies distal branches of the cerebral vasculature leading to vital or nonvital areas of the brain, is typically slow. Previous pathologic reports [2) 3)] have described these aneurysms as large globoid or pear-shaped masses with a 1.0 to 4.0-mm-thick fibrous wall that may contain numerous small vessels similar to vasa vasorum. Their vascular channels do not seem to be residual lumina of the parent artery but are typically intrathrombotic canals that are not endothelialized and do not contain normal elastic lamina or media. The parent vessel is usually a branch of the middle or posterior cerebral artery, the distal vertebral artery at its junction with the basilar artery, or the supraclinoid internal carotid artery.

Diagnosis

The radiologic findings of giant serpentine aneurysms are characteristic. Plain-film radiographs may show pineal displacement caused by the mass, curvilinear calcification, and erosive change involving the skull base. CT scans demonstrate an oval-shaped mass of mixed density. On nonenhanced scans, heterogeneous regions of increased attenuation represent thrombus, and tubular regions of decreased attenuation represent a patent vascular channel. After contrast administration, enhancement of the serpentine vascular channel is apparent [4) 5)].

The MR imaging findings of giant serpentine aneurysms have not been extensively reported but consist of a mass lesion with a heterogeneous signal that represents various stages of hemoglobin degradation and flow void regions. The aneurysm is clearly separated from normal parenchyma, and the vascular channel, which may be evaluated by phase-contrast MR angiography, may be visible. In our case it was clearly visualized, though its distal small branches were unclear. Conventional angiography is the most powerful means of evaluating the location and state of flow of a giant serpentine aneurysm [6)]

Treatment

The treatment of giant serpentine aneurysms should aim to arrest their growth, to eliminate the mass effect, and to obliterate the abnormal vascular channel. The most effective way of accomplishing these goals is the direct and permanent occlusion of the parent artery at the origin of the aneurysm. This can be best achieved by endovascular means: selective catheterization of the parent artery and occlusion of the vessel with detachable balloons, N-butyl cyanoacrylate, or Guglielmi detachable coils. Endovascular occlusion of the parent artery should be performed after careful functional testing of the distal territory to assess any potential neurologic deficit that may ensue [7)]

Case reports

A 51-years-old male patient presented with a headache and mild right hemiparesis. He had a Giant serpentine aneurysm (GSA) arising from the left fetal-type posterior cerebral artery (fPCA) that was out of follow-up for six years. Radiological images revealed midline shifting and mesencephalon compression. They performed endovascular parent artery occlusion with coil. The symptoms of the patient improved at the first-month follow-up. Even if there is a mass effect in GSAs, deconstructive EVT is a safe and feasible method for managing these lesions [8].

Lan et al., report a case of 43-year old women with a giant serpentine aneurysm (GSA) arising from the middle cerebral artery (MCA). There is a separate inflow and outflow channel of the aneurysm, of which the outflow channel feeds the distal branches of the parent artery and supplies normal brain parenchyma.The serpentine aneurysm was treated successfully by aneurysmectomy, superficial temporal artery (STA)-MCA bypass followed by proximal occlusion and vascular reconstruction. The specimen from the aneurysm was obtained and was examined to correlate the pathologic findings and morphologic characteristics.

Pathological results showed that the thickness of the aneurysmal wall was typically increased and varied, and there was no internal elastic lamina or endothelial lining could be identifed. The sac contains thrombi of various ages with recanalizing vessel formation and chronic inflammation infiltration. Intimal hyperplasia and neoangiogenesis in the wall and hyaline degeneration of the media was observed. The vessels coursing in their adventitia showed mucoid change, which are responsible for the contrast enhancement of the aneurysmal rim on Computed Tomography (CT) scan.

GSAs are a specific pathologic entity, with unique morphological and pathological characteristics, that can affect the intracranial blood vessels. The pathogenic mechanisms were unclear, this report suggested that GSAs occurrence may be associated with the degeneration of the vascular wall [9].

1)
Aletich VA, Debrun GM, Monsein LH, Nauta HJ, Spetzler RF. Giant serpentine aneurysms: a review and presentation of five cases. AJNR Am J Neuroradiol. 1995 May;16(5):1061-72. Erratum in: AJNR Am J Neuroradiol 1995 Sep;16(8):1747. PMID: 7639128; PMCID: PMC8337803.
2)
Tomasello F, Albanese V, Cioffi FA. Giant serpentine aneurysms: a separate entity. Surg Neurol. 1979;12:429–432.
3)
Fodstad H, Liliequist B, Wirell S, Nilsson PE, Boquist L, Abdul-Rahman A. Giant serpentine intracranial aneurysm after carotid ligation: case report. J Neurosurg. 1978;49:903–909.
4)
Haddad GF, Haddad FS. Cerebral giant serpentine aneurysm: case report and review of the literature. Neurosurgery. 1988;23:92–97.
5)
Belec L, Cesaro P, Brugieres P, Gray F. Tumor-simulating giant serpentine aneurysm of the posterior cerebral artery. Surg Neurol. 1988;29:210–215.
6) , 7)
Park JS, Lee MS, Kim MS, Kim DJ, Park JW, Whang K. Giant serpentine intracranial aneurysm: a case report. Korean J Radiol. 2001 Jul-Sep;2(3):179-82. doi: 10.3348/kjr.2001.2.3.179. PMID: 11752991; PMCID: PMC2718118.

8)
Civlan S, Yakar F, Coskun ME, Sato K. Endovascular occlusion of giant serpentine aneurysm: A case report and literature review. J Cerebrovasc Endovasc Neurosurg. 2022 Jan 14. doi: 10.7461/jcen.2022.E2021.06.003. Epub ahead of print. PMID: 35026888.
9)
Lan J, Fu ZY, Zhang JJ, Ma C, Cao CJ, Zhao WY, Jiang PC, Chen JC. Giant Serpentine Aneurysm of the Middle Cerebral Artery. World Neurosurg. 2018 Jun 8. pii: S1878-8750(18)31201-4. doi: 10.1016/j.wneu.2018.05.247. [Epub ahead of print] PubMed PMID: 29890279.