Middle cerebral artery branch occlusion mimicking a saccular aneurysm on 3D digital subtraction angiography

Case report

MONICA SMITH PEARL, M.D.,1 RAFAEL TAMARGO, M.D.,2 AND PHILIPPE GAULLAUD, M.D.1

1Division of Interventional Neuroradiology, and 2Cerebrovascular Surgery, The Johns Hopkins Hospital, Baltimore, Maryland

The angiographic appearance of an intracranial arterial occlusion is typically distinct from that of a saccular aneurysm, with only a few reported cases of occlusion simulating aneurysm. At the same time, a small percentage of symptomatic intracranial aneurysms present with a stroke. Accurate diagnosis of these conditions is crucial, as their treatment differs. The authors report on a case of middle cerebral artery occlusion that mimicked the appearance of an aneurysm on angiography in the setting of acute stroke. The true diagnosis was not elucidated until repeated angiography 6 months later revealed recanalization of the previously occluded middle cerebral artery branch. This angiographic pitfall is important to consider when acute stroke is suspected as the mode of presentation of a saccular aneurysm. (DOI: 10.3171/JNS.2008.109.12.1123)

KEY WORDS • cerebral aneurysm • imaging • pitfall • stroke

Abbreviations used in this paper: DSA = digital subtraction angiography; MCA = middle cerebral artery.

Most intracranial aneurysms are asymptomatic, with subarachnoid hemorrhage from rupture, occurring at an annual rate of 1.3%,4 being the most common presentation.2,11 Less often unruptured aneurysms may cause various neurological symptoms secondary to mass effect or thromboembolic events involving the vascular territory distal to the aneurysm.1,10,11 It has been estimated that ~ 3.3% of patients with aneurysms present with symptoms secondary to embolization that originate from the aneurysmal sac, most commonly within the MCA territory.10 We report on a case of MCA branch occlusion whose angiographic appearance mimicked that of a saccular aneurysm in a patient with acute stroke. Few observations of intracranial artery occlusion simulating an aneurysm have been published, and all previously reported cases have involved vessels of the posterior circulation.5–8

Case Report

This 41-year-old left-handed woman with lupus and lupus nephritis presented with acute onset of word-finding difficulties. Magnetic resonance imaging of her brain showed an acute infarct in the posterior aspect of the insula on the left side. Digital subtraction angiography revealed a 1.9 × 1.4-mm saccular aneurysm at the left MCA bifurcation, and this finding was confirmed on 3D DSA (Fig. 1 upper). Retrograde opacification of several distal MCA branches was observed, confirming the occurrence of diffuse thromboembolic events. The initial workup results included a nondiagnostic transthoracic echocardiogram, the absence of anticardiolipin antibodies, normal cholesterol and homocysteine levels, and a normal erythrocyte sedimentation rate. Transesophageal echocardiography performed later yielded entirely normal results. There was no evidence of a patent foramen ovale. A hypercoagulable screen for protein C, protein S, antithrombin III, activated protein C resistance, and factor II mutation was negative. The diagnosis of distal clot migration from the aneurysmal sac was suggested.

The patient’s condition was stabilized, and she was discharged with a normal neurological status. Presented with the relative risks and benefits of surgical treatment, the patient chose to have her aneurysm clipped. The treatment was delayed at her request for personal reasons. Due to the unusual presentation, preoperative angiography was performed immediately prior to surgery, ~ 6 months later. At that time, DSA revealed recanalization of an occluded
left MCA branch, whose origin from the MCA bifurcation corresponded with the previously suspected aneurysm (Fig. 1 lower).

Discussion

This case has a number of unusual features including clinical presentation, structural characteristics of the arterial occlusion, and MCA branch anatomy, which contributed to the initial misdiagnosis. The MCA branch occlusion was initially thought to be an aneurysm presenting as an acute stroke despite the uncommon association of intracranial aneurysms with ischemia.

Nonetheless, in our patient the morphological characteristics of the MCA branch occlusion, with its unusual convex arterial cut-off pattern, simulated the typical appearance of an aneurysm, compared with the concavity that would be expected from the presence of an intraluminal clot. Pillai et al. described the angiographic appearance of intracranial vascular occlusions in acute stroke, classifying the different morphological patterns as cut-off, meniscus, tapered, tram track, or tandem, and providing schematic and angiographic representatives of each. The closest description is the cut-off; however, this does not entail the convex outward bulging appearance seen in our case, an appearance typical of an aneurysm.

The follow-up angiogram demonstrated recanalization of a proximally occluded MCA branch at a 4-branch MCA bifurcation, hitherto misdiagnosed. The previously identified aneurysm at the presumed MCA trifurcation was in fact an occluded fourth MCA branch. In their study of 50 cerebral hemispheres, Gibo and colleagues found that variations in MCA division patterns ranged from 2 to 4 or more trunks with MCA bifurcation in 78%, and trifurcation or division into multiple trunks less common, 12 and 10%, respectively. Thus, the possibility of occlusion of a branch of a multiple-division MCA could have been considered; however, the atypical appearance was more characteristic of an aneurysm than an occlusion.

Five cases of intracranial artery occlusion mimicking the appearance of an aneurysm have been reported in the literature, all of which involved the posterior circulation. The occluded vessels reported were 2 vertebral arteries, 1 fenestrated basilar artery, 1 posterior cerebral artery, and 1 posterior communicating artery. All cases, except for the vertebral artery occlusion secondary to dissection, were diagnosed after exploratory surgery for a presumed aneurysm. The follow-up preoperative angiogram in our case was instrumental in making the correct diagnosis, averting unnecessary surgical intervention. Recognition of unconventional angiographic appearances of arterial occlusion and normal variations in anatomy, as well as conducting follow-up studies are important in unusual cases.

Conclusions

The occurrence of an acute ischemic event secondary to clot migration from the aneurysmal cavity to the distal arterial distribution is an infrequent but well-documented phenomenon. This case report shows, however, that an arterial branch occlusion can sometimes take on an atypical angiographic appearance that mimics that of a saccular aneurysm. This angiographic pitfall is important to consider, in particular when aneurysm therapy is planned.

Disclaimer

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References

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Address correspondence to: Philippe Gailloud, M.D., Division of Interventional Neuroradiology, Department of Radiology and Radiological Sciences, The Johns Hopkins Medical Institutions, Baltimore, Maryland 21287. email: phg@jhmi.edu.