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Unilateral approach for bilateral middle cerebral artery aneurysms assisted by preoperative understandings of aneurysm wall properties: 2-dimensional operative video

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Key words:
intracranial aneurysm, middle cerebral artery, contralateral approach, unilateral approach, surgical technique, computational fluid dynamic analysis, atherosclerosis

Short title: Contralateral clipping with knowing wall properties

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Abstract:

Unruptured middle cerebral artery (MCA) aneurysms often exist bilaterally, and a unilateral approach for bilateral MCA aneurysms has been reported; however, this remains challenging because there is a variety of technical nuances[1], [2], [3], [4]. Wall properties have been reported to be an important issue for this strategy[2], [3]. Atherosclerotic changes in the aneurysm wall can make clipping difficult. We present a case underwent bilateral MCA aneurysms clipping via a unilateral craniotomy assisted by preoperative understandings of the aneurysm wall properties using computational fluid dynamic (CFD) analysis. A 71-year-old woman had bilateral MCA bifurcation aneurysms. The oscillatory shear index (OSI) color map by CFD analysis demonstrated that the contralateral MCA AN did not have a high OSI area in the dome, which means that there was no wall thickening, and the ipsilateral MCA aneurysm had scattered high OSI areas, which were expected to have extreme wall thickening areas[5]. After a pterional craniotomy, the sylvian fissure was widely opened. As expected, the contralateral MCA AN did not have a thick-walled region, enabling simple neck clipping using a straight clip. On the other hand, the ipsilateral MCA aneurysms had thick-walled areas, as predicted, and necessitated a multiple clip application. Postoperatively, the patient was discharged without any neurological deficits. Prediction of aneurysm wall properties using CFD analysis could assist the decision for clippability of intracranial aneurysms, especially for aneurysms approached by narrow and deep surgical fields such as contralateral MCA aneurysms. The patient consented to the procedure and the publication of their images.

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