

Middle cerebral artery bifurcation aneurysm

- [The Woven EndoBridge for Wide-Neck Bifurcation Aneurysms: A Retrospective Study of 120 Cases with Expanded Indications Covering All Subtypes](#)
- [Remote cerebral vasospasm following elective clipping of middle cerebral artery bifurcation-A1 aneurysms: A correspondence and review of putative pathophysiological mechanisms](#)
- [Endovascular Treatment of Wide-Neck Intracranial Aneurysms Using the Novel Contour Neurovascular System: 5-Year Follow-Up](#)
- [Insular branch resembling lenticulostriate artery from M2 inferior trunk of middle cerebral artery: cadaver anatomic study](#)
- [Continuous Intra-arterial Infusion of Verapamil for Severe Vasospasm Treatment After Subarachnoid Hemorrhage: A Case Report](#)
- [Woven endobridge embolization versus microsurgical clipping for unruptured wide-neck cerebral aneurysms on middle cerebral artery bifurcation](#)
- [Long-Term Outcomes of Surgical Clipping of Woven EndoBridge-Eligible Middle Cerebral Artery Bifurcation Aneurysms](#)
- [Concomitance of persistent primitive olfactory artery, accessory middle cerebral, and early bifurcated anterior cerebral arteries](#)

Of the [middle cerebral artery aneurysms](#), those located at the main bifurcation of the [middle cerebral artery](#) (MCA) (MbifA) are by far the most frequent.

Middle cerebral artery bifurcation aneurysms are often broad necked and may involve one or both branches of the bifurcation (M2s). The anatomical and hemodynamic features of MbifAs make them usually more favorable for microneurosurgical treatment. In population-based services, MbifAs are frequent targets of elective surgery (unruptured), acute surgery (ruptured), and emergency surgery (large ICH), even advanced approaches (giant). The challenge is to clip the neck adequately, without neck remnants, while preserving the bifurcational flow ¹⁾.

Classification

[Middle cerebral artery bifurcation aneurysm classification.](#)

Case series

A total of 28 patients with 32 [bifurcation aneurysms](#) of the middle cerebral artery > 3 mm in size were retrospectively selected for this study. [High-resolution magnetic resonance vessel wall imaging](#) were reviewed, and the [aneurysm wall enhancement](#) (AWE) pattern of each aneurysm was classified as no AWE, partial AWE, and circumferential AWE. Computational fluid dynamics were used to calculate the hemodynamic variables of each aneurysm. Univariate and multivariate analyses investigated the association between AWE and hemodynamic variables.

AWE was present in 13 aneurysms (40.6%), with 7 (21.9%) showing partial AWE and 6 (18.7%)

showing circumferential AWE. Kruskal-Wallis H analysis revealed that hemodynamic variables including wall shear stress (WSS), oscillatory shear index, aneurysm pressure (AP), relative residence time, and low shear area (LSA) were significantly associated with AWE ($p < 0.05$). Further ordinal logistic regression analysis found that WSS was the only factor with a significant association with AWE ($p = 0.048$); similar trends were identified for LSA ($p = 0.055$) and AP ($p = 0.058$). Spearman's correlation analysis showed that AWE was negatively correlated with WSS ($r_s = -0.622$, $p < 0.001$) and AP ($r_s = -0.535$, $p = 0.002$) but positively correlated with LSA ($r_s = 0.774$, $p < 0.001$).

Low [wall shear stress](#), low aneurysm pressure, and increased low shear area were associated with aneurysm wall enhancement on vessel wall magnetic resonance imaging in unruptured cerebral aneurysms. These abnormal hemodynamic parameters may induce inflammation and cause aneurysm wall enhancement. However, the association between these parameters and their underlying pathological mechanisms requires further investigation ²⁾.

2017

Forty patients with 46 middle cerebral artery bifurcation aneurysms were treated microsurgically by the same surgeon. Aneurysms were classified according to shape and the Fisher test was applied to analyze the effect of morphology on the pre-operative and intra-operative rupture. Results:

Pre-operative and intra-operative ruptures were observed in 8/46 patients (17.4%) and 14/46 patients (30.4%) respectively. Thirty-two cases (69.6%) had no symptoms postoperatively, modified Rankin score (MRS) of 0; 6.5% had MRS of 1 (no significant disability); 13% had MRS of 2 (slight disability); 4.3% had moderately severe disability (MRS of 4); and there were 3 deaths (6.5%) post-operatively. The morphology was not directly related to the rupture rate. Conclusion:

In general, ruptures are not affected by the morphology or the studied variables. Larger series are needed to validate these outcomes ³⁾.

2016

A total of 169 consecutive patients with 177 bifurcation-type MCAs were reviewed from August 2011 to January 2016. Based on the clinical and morphologic characteristics findings, the risk factors of aneurysm rupture were assessed using statistical methods.

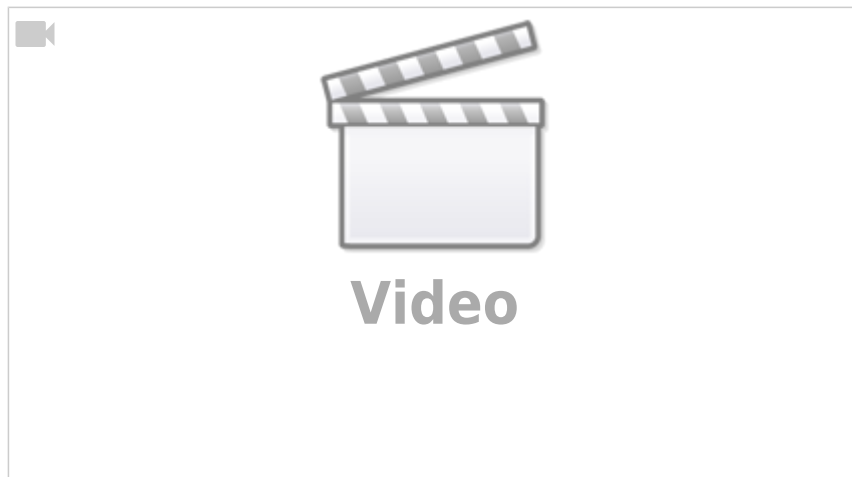
Age, cerebral [atherosclerosis](#), no hypertension, hypertension grade 2 and coronary artery disease (CAD) were negatively correlated with aneurysm rupture. The mean diameter (MD) of the parent and two daughter arteries was negatively correlated with rupture. Aneurysms with irregularity, depth, width, maximum size, aspect ratio, depth-to-width ratio, bottleneck factor, and size ratio were positively correlated with rupture. The multivariate logistic regression model revealed that irregular shape (odds ratio (OR) 2.697) and aspect ratio (OR 3.723) were significantly and positively correlated with rupture, while cerebral atherosclerosis (OR 0.033), CAD (OR 0.080), and MD (OR 0.201) were negatively correlated with rupture. Receiver operating characteristic analysis revealed that the threshold value of the aspect ratio and MD were 0.96 and 2.43 mm, respectively.

Cerebral atherosclerosis and CAD are protective factors against rupture. Morphological characteristics such as an aneurysm with an irregular shape, a high aspect ratio (>0.96) and a small MD (<2.43 mm)

are likely better predictors of rupture ⁴⁾.

Videos

Technical nuances of clipping a middle cerebral artery bifurcation aneurysm



Case reports from the HGUA

A 62-year-old female patient was admitted due to a sudden subarachnoid hemorrhage. She presented with a severe headache, nausea, vomiting, and temporary vision loss in the right eye. Initial assessments revealed a Glasgow Coma Scale (GCS) of 15 but the intense headache persisted.



A cranial CT scan showed an aneurysmatic subarachnoid hemorrhage with multiple aneurysms, including one in the distal M1 segment of the middle cerebral artery (ACM-M1) and fusiform dilations in the left internal carotid and vertebral arteries.

In the Emergency Department, the patient's headache and hypertension were treated with fentanyl and labetalol. As her condition worsened leading to intubation. Subsequent CT scans revealed an extension of the hemorrhage with signs of incipient hydrocephalus and potential herniation. An external ventricular drain (EVD) was placed, and arteriography was expedited.



¹⁾

Dashti R, Hernesniemi J, Niemelä M, Rinne J, Porras M, Lehecka M, Shen H, Albayrak BS, Lehto H, Koroknay-Pál P, de Oliveira RS, Perra G, Ronkainen A, Koivisto T, Jääskeläinen JE. Microneurosurgical management of middle cerebral artery bifurcation aneurysms. *Surg Neurol*. 2007 May;67(5):441-56. Review. PubMed PMID: 17445599.

²⁾

Zhong W, Du Y, Kuang H, Liu M, Xue F, Bai X, Wang D, Su W, Wang Y. Hemodynamic Characteristic Analysis of Aneurysm Wall Enhancement in Unruptured Middle Cerebral Artery Aneurysm. *Front Neurol*. 2022 May 9;13:781240. doi: 10.3389/fneur.2022.781240. PMID: 35614912; PMCID: PMC9126028.

³⁾

Estevão IA, Camporeze B, Araujo AS Jr, Nery B, Antunes ACM, Smith TR, Aguiar PHP. Middle cerebral artery aneurysms: aneurysm angiographic morphology and its relation to pre-operative and intra-

operative rupture. Arq Neuropsiquiatr. 2017 Aug;75(8):523-532. doi: 10.1590/0004-282x20170082. PubMed PMID: 28813082.

4)

Wang GX, Yu JY, Wen L, Zhang L, Mou KJ, Zhang D. Risk Factors for the Rupture of Middle Cerebral Artery Bifurcation Aneurysms Using CT Angiography. PLoS One. 2016 Dec 15;11(12):e0166654. doi: 10.1371/journal.pone.0166654. PubMed PMID: 27977691.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=middle_cerebral_artery_bifurcation_aneurysm

Last update: **2024/12/16 11:51**

