Aneurysm shape

Irregular shape is a known risk factor of intracranial aneurysm rupture causing subarachnoid hemorrhage.

An irregularly shaped aneurysm may be at a greater risk of rupture than a spherical saccular aneurysm. The irregular shape includes morphological characteristics such as daughter blebs, or irregular borders.

The objective of a retrospective study from Goertz et al., from the University Hospital of Cologne, Germany was to determine the impact of aneurysm shape on intraoperative rupture (IOR) during microsurgical clipping of ruptured aneurysms.

A single-center study of consecutive patients that underwent clipping between 2010 and 2017. Based on three-dimensional reconstructions from preoperative computed tomography and digital subtraction angiography, aneurysm shape was classified as regular (RA) or irregular (IRA). Risk factors for IOR were identified using univariate and multivariate statistical analysis.

A total of 138 patients with 32 RAs and 102 IRAs were included in the analysis. IRAs had a larger size than RAs (8.3 ± 3.5 mm vs. 4.6 ± 2.3 mm; $p < 0.001$). There were 36 instances of IOR (26.1%). The IOR rate was greater in IRAs than in RAs (31.1% vs. 9.4%; $p = 0.02$). In multivariate analysis, irregular aneurysm shape was the only significant independent risk factor for IOR (OR: 3.9, 95% CI: 1.0 - 14.6; $p = 0.047$). Unfavorable outcome (modified Rankin scale > 2) was not significantly associated with aneurysm shape ($p = 0.998$) and IOR ($p = 0.260$)

The results demonstrate that irregular aneurysm shape is an independent risk factor for IOR. With the patient cohort that they examined aneurysm shape and IOR had no significant impact on patient prognosis [1].

Multilobularity of ruptured aneurysms was significantly higher than in unruptured. Metric variables describing the geometry (height, width, etc.) and shape are the most predictive for rupture. One or two of them alone are already reliable predictors. Ratios are completely redundant in saccular aneurysm [2].

1)
Goertz L, Hamisch C, Telentschak S, Kabbasch C, von Spreckelsen N, Stavrinou P, Timmer M, Goldbrunner R, Brinker G, Krischek B. Impact of aneurysm shape on intraoperative rupture during clipping of ruptured intracranial aneurysms. World Neurosurg. 2018 Jul 18. pii: S1878-8750(18)31536-5. doi: 10.1016/j.wneu.2018.07.058. [Epub ahead of print] PubMed PMID: 30031199.

2)
Fung C, Mavrakis E, Filis A, Fischer I, Suresh M, Tortora A, Cornelius JF, Bostelmann R, Gralla J, Beck J, Raabe A, Khan MO, Steiger HJ, Petridis AK. Anatomical evaluation of intracranial aneurysm rupture risk in patients with multiple aneurysms. Neurosurg Rev. 2018 Jun 30. doi: 10.1007/s10143-018-0998-1.

[Epub ahead of print] PubMed PMID: 29959638.