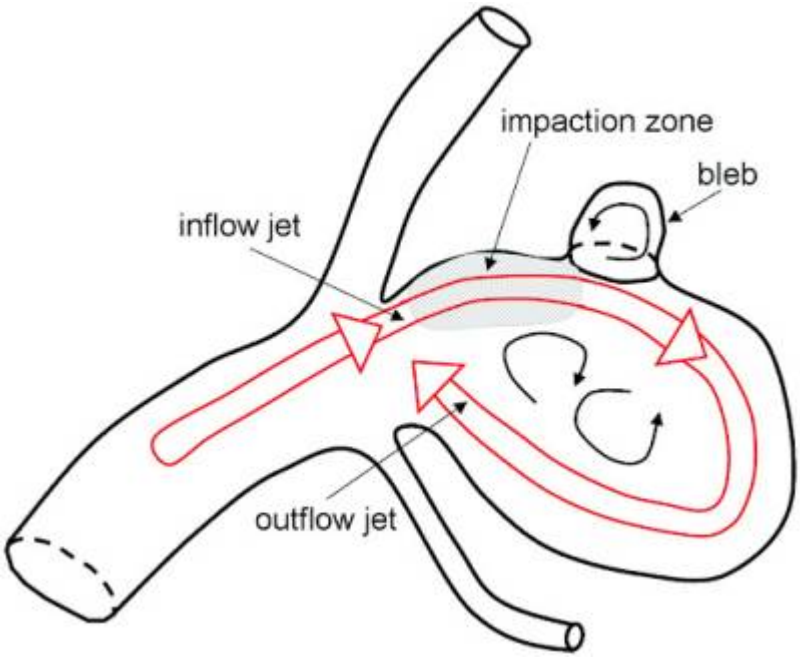
Aneurysm bleb

The presence of blebs in intracranial aneurysms has been identified as a risk factor for aneurysm rupture in clinical studies.



Autopsy and surgical observations have also shown that aneurysm rupture sites tend to occur at blebs or in their immediate vicinity.

Blebs are common in IAs, and most aneurysms harboring blebs have a single bleb. Blebs in the aneurysm neck are rare, but they are equally common in the body and dome. The presence of blebs in IAs was associated with dental infection and negatively associated with hormone replacement therapy [1)].

Formation

De novo aneurysm bleb formation may occur in areas associated with the combination of high pressure, low Wall shear stress (WSS), and the center of divergent WSS vectors. The multipoint method is useful for the statistical analysis of hemodynamics in a limited number of aneurysms [2)].

Blebs form at or adjacent to regions of high WSS and are aligned with major intra-aneurysmal flow structures. The formation of blebs results in a lower Wall shear stress (WSS) state with the formation of a counter-current vortex. These findings imply that locally elevated WSS could contribute to the focalized wall damage that formed these structures [3)].

Case reports

A 73-year-old man with a small anterior communication artery aneurysm, 4 mm in diameter, while on

follow-up, developed an aneurysmal subarachnoid hemorrhage 2 weeks after the detection of a newly emerged bleb on the surface of the aneurysm. In conclusion, the formation of a bleb should be considered as a warning sign of an impending rupture, and treatment should be provided even for patients with small aneurysms [4)]

1)
Salimi Ashkezari SF, Detmer FJ, Mut F, Chung BJ, Yu AK, Stapleton CJ, See AP, Amin-Hanjani S, Charbel FT, Rezai Jahromi B, Niemelä M, Frösen J, Zhou J, Maiti S, Robertson AM, Cebral JR. Blebs in intracranial aneurysms: prevalence and general characteristics. J Neurointerv Surg. 2021 Mar;13(3):226-230. doi: 10.1136/neurintsurg-2020-016274. Epub 2020 Jul 17. PMID: 32680877; PMCID: PMC8294207.
2)
Uno T, Misaki K, Futami K, Nambu I, Yoshikawa A, Kamide T, Uchiyama N, Nakada M. Hemodynamic factor evaluation using computational fluid dynamics analysis for de novo bleb formation in unruptured intracranial aneurysms. Neurol Sci. 2021 Jul 31. doi: 10.1007/s10072-021-05482-x. Epub ahead of print. PMID: 34331615.
3)
Cebral JR, Sheridan M, Putman CM. Hemodynamics and bleb formation in intracranial aneurysms. AJNR Am J Neuroradiol. 2010 Feb;31(2):304-10. doi: 10.3174/ajnr.A1819. Epub 2009 Oct 1. PMID: 19797790; PMCID: PMC2859623.
4)
Yamano A, Yanaka K, Uemura K, Onuma K, Nakamura K, Ishikawa E. Bleb formation in small unruptured intracranial aneurysm as a predictor of early rupture. J Surg Case Rep. 2018 May 29;2018(5):rjy117. doi: 10.1093/jscr/rjy117. PMID: 29977511; PMCID: PMC6007435.