Balloon remodeling technique (BRT)

Remodeling technique and stenting represent important options for intracranial aneurysm treatment, and they sometimes need to be combined.

The 'balloon-then-stent' method involves stent placement after completion of a balloon-assisted embolization.

The drawback to this technique is that the coil mass achieved during balloon remodeling must be crossed prior to stent deployment. This additional maneuver introduces the potential risk of coil disruption.

The technology of remodeling balloons and stents has evolved with the development of the double-lumen remodeling balloon (Scepter and Ascent) and the low-profile stent (LVIS Jr).

Primary BRT followed by stent-assisted coiling may be associated with fewer residual aneurysms at 12 to 18 months as compared to stent-assisted coiling alone [1)].

The use of balloons in the field of neurosurgery is currently an essential part of our clinical practice. The field has evolved over the last 40 years since Serbinenko used balloons to test the feasibility of occluding cervical vessels for intracranial pathologies. Since that time, indications have expanded to include sacrificing cervical and intracranial vessels with detachable balloons, supporting the coil mass in wide-necked aneurysms (balloon remodeling technique), and performing intracranial and cervical angioplasty for atherosclerotic disease, as well as an adjunct to treat arteriovenous malformations. With the rapid expansion of endovascular technologies, it appears that the indications and uses for balloons will continue to expand [2)].

Delgado Acosta et al. aimed to report the characteristics of patients suffering intra- or peri-procedural ruptures during embolization of cerebral aneurysms.

Between March 1994 and October 2021, 648 consecutive cerebral aneurysms were treated by the endovascular procedure. Medical records were reviewed retrospectively with emphasis on procedure description, potential risk factors, and clinical outcomes related to intra- or peri-procedural rupture.

Of the 648 patients, 17 (2.6%) suffered an intra- or peri-procedural hemorrhagic event. The most common location was the anterior communicating artery. There was no significant difference between previously ruptured and unruptured aneurysms in the incidence of bleeding. In four patients, bleeding was evident within 24 h after the procedure. The clinical evolution at three months was poor and only four patients presented a positive evolution. There were 11 deaths (64.71%). Balloon remodeling was associated with an increased frequency of ruptures, while stenting was a safer treatment.

Aneurysm rupture during endovascular therapy is unpredictable, and its occurrence can be devastating. The incidence is quite low although the outcome is frequently poor. Early detection and proper management, including prompt occlusion of the aneurysm, are important to achieve a positive outcome. Anterior communicating artery aneurysms and those treated with balloon catheters have a higher incidence of rupture. A small number of ruptures of uncertain origin occur that go unnoticed in digital subtraction angiograms [3)].

1)

Gentric JC, Biondi A, Piotin M, Mounayer C, Lobotesis K, Bonafé A, Costalat V. Balloon remodeling may improve angiographic results of stent-assisted coiling of unruptured intracranial aneurysms. Neurosurgery. 2015 Apr;76(4):441-5. doi: 10.1227/NEU.0000000000000639. PubMed PMID: 25621980.

2)

Alaraj A, Wallace A, Dashti R, Patel P, Aletich V. Balloons in endovascular neurosurgery: history and current applications. Neurosurgery. 2014 Feb;74 Suppl 1:S163-90. doi: 10.1227/NEU.0000000000000220. PubMed PMID: 24402485.

3)

Delgado Acosta F, Bravo Rey I, Jiménez Gómez E, Saucedo VR, Toledano A, Oteros Fernández R. Intra- or peri-procedural rupture in the endovascular treatment of intracranial aneurysms. Acta Neurol Scand. 2022 Aug 17. doi: 10.1111/ane.13686. Epub ahead of print. PMID: 35975464.