Case lesson 52/2026

"Kissing Balloons" Technique for Middle Cerebral Artery Bifurcation Aneurysms

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Introduction: Endovascular coiling has become a standard treatment for intracranial aneurysms, however, wide-neck aneurysms, particularly at bifurcation points, remain technically challenging. The balloon remodeling technique, first described to improve coil stability and prevent prolapse, has significantly expanded the indications for endovascular therapy. In complex bifurcation aneurysms, the double-balloon remodeling technique provides enhanced neck protection and allows safe embolization by stabilizing coils and preserving branch vessels[1].

Case presentation: A 38 years old male had an acute onset of right hemicrania localized at temporal region,later on an epileptic attack was evident at ER. He never experienced such situation before and there is not past medical history. GCS 14,no neurological deficits. CT scan and CTA were performed and showed subarachnoid haemorrhage with a right Sylvian hematoma and a right MCA ruptured aneurysm (Figure 1). DSA followed and showed a wide neck aneurysm 12.7 mmx 4.9mm of MCA. Wide neck MCA aneurysms are challenging for clipping and coiling. After discussion on morphology,rupture status, neck dome ratio < 2,wide neck > 4,and no vasospasm, the vascular team proposed endovascular kissing double ballooning treatment as first option over microsurgical clipping. A double-balloon remodeling technique with coil embolization was performed under general anesthesia and systemic heparinization: Two compliant balloons were positioned across the aneurysm neck. Simultaneous inflation during coil deployment ensured stabilization of coils within the aneurysm sac and prevented coil protrusion (Figure 3). Complete and stable occlusion was achieved uneventfully (Figure 4).

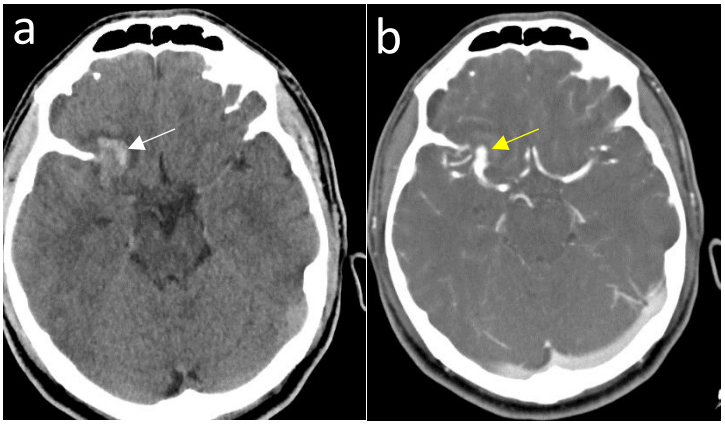

Figure 1: *CT scan showing SAH and a small temporal hematoma (white arrow)* ***(a);*** *CTA showing the aneurysm of MCA (yellow arrow)* ***(b)***

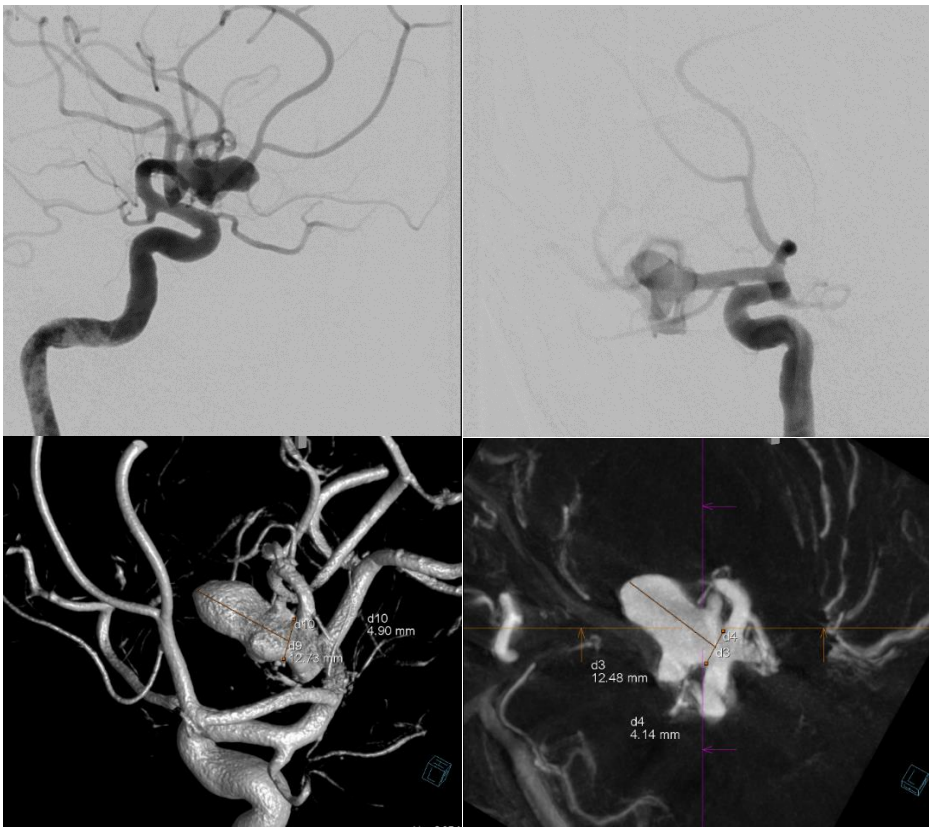

Figure 2: *DSA demonstrating the right MCA aneurysm, its measurements and its morphology*

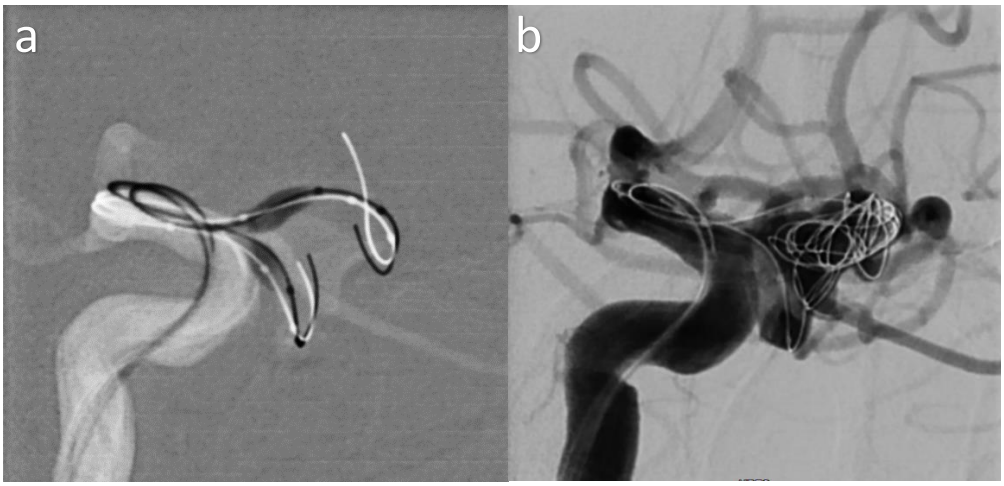

Figure 3: *endovascular treatment DSA: (a) double balloon technique, (b) entering coils in the aneurysm*

Discussion: Wide-neck aneurysms (neck ≥4 mm or dome-to-neck ratio <2) are difficult to treat due to risk of coil instability, prolapse into parent artery, or probably incomplete occlusion. Standard coiling alone is often insufficient in such cases, therefore two balloon catheters are used to prevent the encroachment of coils onto the parent artery[2]. The balloon remodeling technique involves temporary inflation of a balloon across the aneurysm neck during coil deployment. This allows improved coil

packing density and gives better aneurysm occlusion rates[3]. Studies have shown safety of this technique comparable to standard coiling**,** but anatomical outcomes are often superior [1,2,3]. Remodeling has become a key technique for complex aneurysms.

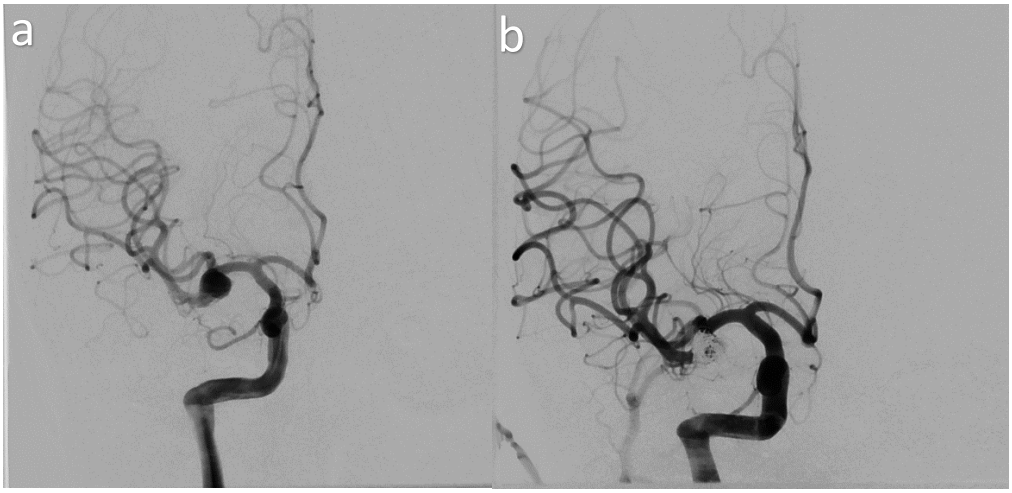

Figure 4*: DSA before (a) and after (b) aneurysm embolization*

In a recent retrospective review[4], microsurgical clipping remains the preferred modality for treatment of ruptured and unruptured MCA bifurcation aneurysms, but the decision is always patient-related, depending on aneurysm size and morphology, size of hematoma, clinical presentation and risks for complications. The complex morphology makes neck control difficult for surgery. The endovascular treatment with coils is widely used for aneurysms of other locations. The technique, materials are progressively developed, the experiences are following their learning curve with improved results challenging, open microsurgery fixed on clipping with ICG control instead of DSA,and bypasses.

The double-balloon or `kissing` technique (Figure 5) is superior, it protects both branches at the bifurcation, improves neck sealing, has a lower rate of coil protrusion and better control of aneurysm complex geometry, and protects small branches when visible, especially where plaque exists. This is particularly relevant in MCA bifurcation aneurysms, where both M2 branches may arise from the aneurysm neck [3].

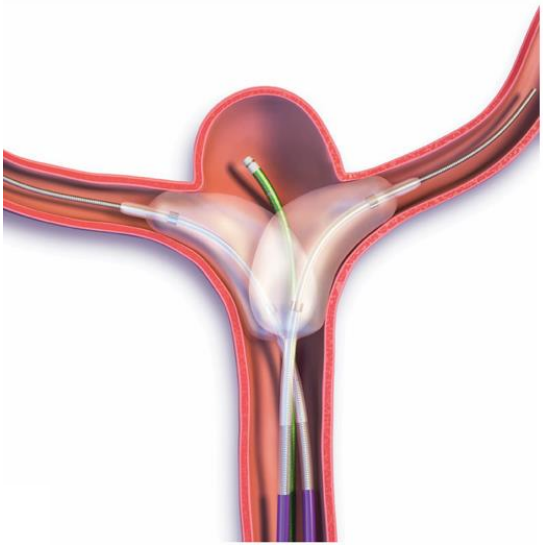

Figure 5: *Double-balloon technique illustrated* [1]

Conclusion: The double-balloon remodeling technique is a highly effective and safe endovascular strategy for the treatment of ruptured wide-neck intracranial aneurysms. In anatomically complex cases, particularly MCA bifurcation aneurysms, this technique allows optimal coil stability, improved occlusion rates, and preservation of branch vessels that may be ignored even by ICG or two dimensional outside inspection during clipping . Its use should be strongly considered in neurointerventional practice,where it is available.

References:

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