Wide-necked intracranial aneurysm treatment

- Technical Success and Clinical Outcomes of the Low-Profile Visualized Intraluminal Support EVO (LVIS EVO) Stent in the Treatment of Intracranial Aneurysms: A Systematic Review and Meta-Analysis
- Safety/Efficacy of a Pusher, Thermal Detachment Coil for Ruptured Intracranial Aneurysms: A Multicenter Real-World Study
- Retreatment rate and strategies for recurrent and residual aneurysms after Woven EndoBridge (WEB) treatment: a comprehensive systematic review and meta-analysis
- Complex Anatomy, Advanced Techniques: Microsurgical Clipping of a Ruptured Hypophyseal Artery Aneurysm
- Pipeline embolization device in treating middle cerebral artery aneurysms: a single-center experience in 69 consecutive patients
- Comparative analysis between stent-assisted coiling and Woven EndoBridge embolization for unruptured wide-necked bifurcation intracranial aneurysms: A propensity score matching study
- Embolization of Ruptured and Unruptured Aneurysms with the Contour Neurovascular System-Summary of 106 Cases
- New Artisse intrasaccular device for intracranial aneurysm treatment: short term clinical and angiographic result from the prospective registry INSPIRE-A

A **wide-necked aneurysm** is defined as:

- Neck ≥ 4 mm, **or**
- Dome-to-neck ratio < 2:1

These aneurysms are challenging to treat due to the risk of **coil prolapse into the parent artery**.

Treatment Options

Endovascular (first-line in most cases)

Stent-assisted coiling

- A self-expanding stent is deployed across the aneurysm neck.
- Acts as a scaffold to support coil placement.
- Examples: **Neuroform Atlas**, **LVIS Jr**.

Balloon-assisted coiling

- A balloon is temporarily inflated across the neck during coil deployment.
- Removed after coiling; does not require antiplatelet therapy.

Intrasaccular devices

- Devices placed entirely within the aneurysm sac.

- Do not cross the neck or require dual antiplatelet therapy.
- Examples: **Woven EndoBridge (WEB)**, **Contour**.

Flow diverter

- Dense mesh stent redirects blood flow away from the aneurysm.
- Promotes thrombosis and remodeling over time.
- Ideal for large, fusiform, or giant unruptured aneurysms.
- Example: **Pipeline Embolization Device**.

Advanced techniques: "Around-the-world" & distal anchoring

- The microcatheter loops through the aneurysm sac to reach the distal parent artery.
- Useful in complex bifurcation anatomy or failed standard access.

Microsurgical

Surgical clipping

- Craniotomy and placement of a clip at the aneurysm neck.
- Offers definitive exclusion of the aneurysm.
- Preferred in:
  - Young patients
  - Bifurcation aneurysms (e.g., MCA)
  - Failed or unsuitable endovascular approach

Considerations

- **Stents and flow diverters** require dual antiplatelet therapy.
- **Ruptured aneurysms** may favor BAC or surgery due to bleeding risk under antiplatelets.
- Decision depends on aneurysm morphology, rupture status, and operator expertise.

Summary Table

Aneurysm Type	Preferred Treatment Options
Wide-neck, unruptured	SAC, BAC, WEB, Flow diverter
Wide-neck, ruptured	BAC (if feasible), Surgical clipping
Complex anatomy	Around-the-world, hybrid approaches

Flow diverter

Stents were initially developed to support the placement of coils inside wide-neck aneurysms. However, early work on a stent-like tubular braided structure led to a more sophisticated construct

that then later was coined as a flow diverter (FD) and found its way into clinical application. Although FDs were initially used to treat wide-neck large and giant internal carotid artery aneurysms only amenable to surgical trap with or without a bypass or endovascular vessel sacrifice, its use in other types of IAs and cerebrovascular pathology promptly followed [1)]

Coiling with stenting

Stent-assisted coiling for wide-neck intracranial aneurysm.

Dual catheter technique

Dual catheter technique. In this case, two microcatheters are placed in the aneurysm. Coil loops are deposited alternatively from each. The technique is proposed to decrease the risk of coil loop prolapse/herniation in wide-neck aneurysms.

Onyx HD 500 has been used for wide-necked or giant ICA aneurysms [2)].

Around-the-world technique

Around-the-world technique

References

1)
Dandapat S, Mendez-Ruiz A, Martínez-Galdámez M, Macho J, Derakhshani S, Foa Torres G, Pereira VM, Arat A, Wakhloo AK, Ortega-Gutierrez S. Review of current intracranial aneurysm flow diversion technology and clinical use. J Neurointerv Surg. 2020 Sep 25:neurintsurg-2020-015877. doi: 10.1136/neurintsurg-2020-015877. Epub ahead of print. PMID: 32978269.
2)
Weber W, Siekmann R, Kis B, et al. Treatment and follow-up of 22 unruptured wide-necked intracranial aneurysms of the internal carotid artery with Onyx HD 500. AJNR Am J Neuroradiol. 2005; 26: 1909–1915