Vertebrobasilar junction aneurysm

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- Concurrent Fenestrations of the Basilar and Anterior Cerebral Arteries
- Stent-Assisted Coil Embolization and Subclavian Artery Stenting via the Radial Approach for Vertebrobasilar Junction Aneurysm Associated with Left Subclavian Artery Occlusion
- Stent-assisted coil embolization of ruptured vertebral artery dissected aneurysm with severe stenosis of bilateral vertebral artery V4 segment by the transmountain technique: a case report and review of the literatures
- A Complex Pediatric Vertebrobasilar Junction Aneurysm Treated using a Flow Diverter with Coiling: Case Report and Management Strategy
- Combined transpetrosal-transtentorial approach with occipital artery anterior inferior cerebellar artery bypass and aneurysm clipping for a lower basilar artery aneurysm involving anterior inferior cerebellar artery: Two-dimensional operative video
- Endovascular Treatment of Large Proximal Basilar Artery Fenestrated Aneurysms: Overlapping Stent with Coil Embolization-A Case Report
- Efficacy and safety of the contralateral approach to vascular lesions in the vertebral artery: patient series
- Endoscopic Transclival Clipping of a Left Vertebrobasilar Junction Aneurysm: 2-Dimensional **Endoscopic Operative Video**

A vertebrobasilar junction aneurysm is a rare type of intracranial aneurysm located at the point where the two vertebral arteries join to form the basilar artery, typically at the level of the lower brainstem (medulla oblongata to pons).

Key points: Anatomy: The vertebrobasilar junction (VBJ) lies at the posterior circulation of the brain, supplying critical areas such as the brainstem, cerebellum, and occipital lobes.

Classification

1. Morphological Classification

- Saccular aneurysms
 - Berry-like, common at arterial bifurcations.
 - Frequently present with subarachnoid hemorrhage.
- Fusiform aneurysms
- Elongated, spindle-shaped.
- Often related to atherosclerosis or dissection.
- Dissecting aneurysms
 - Caused by a tear in the vessel wall.
 - Can lead to pseudoaneurysm formation.

2. Etiological Classification

• Congenital

- Associated with vessel wall weakness.
- Often related to fenestrations.

• Atherosclerotic / Degenerative

- Typically fusiform.
- Found in elderly or patients with vascular risk factors.

• Traumatic / latrogenic

- Result from injury or procedures.
- Rare but possible at the VBJ.

• Infectious (Mycotic)

- $\circ\,$ Rare.
- May be seen in immunocompromised patients.

3. Anatomical / Topographical Classification

• True VBJ aneurysms

• Origin at the vertebrobasilar confluence.

• Adjacent aneurysms

- Involving:
 - Distal vertebral artery (V4 segment)
 - Proximal basilar artery
 - Fenestrated segments of the basilar artery

4. Associated Vascular Anomalies

Basilar artery fenestration

- Strongly associated with VBJ aneurysms.
- $\circ\,$ Seen in up to 70% of some case series.

• Other anomalies

- Vertebral artery hypoplasia or dominance
- Vascular duplications

Summary Table

Criterion	Type / Category
Morphology	Saccular, Fusiform, Dissecting
Etiology	Congenital, Atherosclerotic, Traumatic, Infectious
Anatomy	True VBJ, Distal VA, Proximal BA, Fenestration
Associations	Fenestrations, Vertebral dominance

Etiology

These aneurysms can be saccular (berry-shaped), fusiform, or dissecting, and may arise due to:

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Congenital vessel wall weakness

Atherosclerosis

Trauma

Dissection

Inflammatory or infectious processes

Clinical presentation

Can be asymptomatic, discovered incidentally

Subarachnoid hemorrhage (SAH) if ruptured — sudden severe headache, nausea, loss of consciousness

Brainstem compression symptoms: cranial nerve deficits, diplopia, dysphagia, hemiparesis

Posterior circulation ischemia

Diagnosis

CT angiography (CTA) or MR angiography (MRA)

Digital Subtraction Angiography (DSA) remains the gold standard for detailed vascular anatomy

Management

Depends on size, morphology, and symptoms

Observation in small, asymptomatic, or fusiform aneurysms not amenable to treatment

Endovascular therapy:

Coiling

Flow-diverter stents (though complex in posterior circulation)

Stent-assisted coiling

Microsurgical clipping is challenging due to deep location and proximity to vital structures

Retrospective observational studies

The aim of a retrospective study was to report the incidence, clinical presentation, and midterm clinical and imaging results of endovascular treatment of 10 aneurysms of the vertebrobasilar junction.

Between January 1995 and January 2007, 2112 aneurysms were treated. Ten aneurysms in 10 patients were located on the vertebrobasilar junction and 7 aneurysms (70%) were associated with proximal basilar fenestration. There were 5 men and 5 women, ranging from 29 to 75 years of age. Nine aneurysms presented with subarachnoid hemorrhage, and one was a giant partially thrombosed aneurysm with mass effect on the brain stem.

Nine ruptured aneurysms were treated by primary coil occlusion. One giant unruptured aneurysm was initially treated with bilateral vertebral artery occlusion, 2 months later followed by selective coil occlusion of the remaining aneurysm lumen via the posterior communicating artery. At imaging follow-up of 6-30 months in 7 patients, all aneurysms were adequately occluded. In 2 patients, the vertebrobasilar junction and distal vertebral arteries (including the aneurysm) thrombosed completely on follow-up without clinical sequelae.

Vertebrobasilar junction aneurysms are rare, with an incidence of 0.5% of treated aneurysms at the institution. Vertebrobasilar junction aneurysms are frequently associated with proximal basilar fenestration. Most patients present with subarachnoid hemorrhage. Endovascular treatment is effective and safe in excluding the aneurysms from the circulation ¹⁾.

Case reports

Two cases, one with a small and a giant aneurysm of the VB junction which were surgically clipped; and the other with a small left anterior inferior cerebellar artery (AICA) aneurysm which resolved spontaneously. The patient, however, developed a de-novo giant VB junction aneurysm, which was detected on a follow-up angiogram. This aneurysm was treated by surgical clipping²⁾.

Case Report

Admission for Giant Vertebrobasilar Junction Aneurysm

Patient: Female, 74 years old Chief Complaint: Progressive right-sided motor impairment

Clinical Presentation

The patient presented with:

- Motor clumsiness and weakness in the right hemibody, without prior trauma or exertion
- Occasional dysphagia to liquids
- Poorly defined visual difficulty evolving over several months

Neurological Examination

- Conscious and oriented
- Bradyphrenia (slowed cognitive processing)
- Diplopia on left lateral and superolateral gaze → Right sixth nerve palsy
- Left central facial paresis:
 - Flattening of the nasolabial fold
 - Correction with smiling
- Tongue and uvula midline
- Right hemiparesis (3/5 strength)
- Bilateral and symmetrical sensory function preserved

Cerebral Angiography Findings

- Severe atheromatosis in right femoral and iliac arteries
- Aortic atheromatosis with soft plaques
- Giant aneurysm (23 x 22 x 27 mm) in the distal third of the left vertebral artery (post-PICA)
- The right vertebral artery drains into the aneurysm, near the vertebrobasilar junction
- Degenerative vascular wall changes

Radiological Conclusion

- Giant aneurysm of the left vertebrobasilar junction, involving both vertebral arteries
- Greater symptomatic involvement of the left vertebral artery
- Compression of the brainstem

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