

Ruptured Posterior inferior cerebellar artery aneurysm

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Definition

A **ruptured posterior inferior cerebellar artery (PICA) aneurysm** is a pathological dilatation of the PICA wall that has burst, resulting in bleeding into the subarachnoid space—typically within the posterior fossa.

It most often presents as **posterior fossa subarachnoid hemorrhage (SAH)** and can be life-threatening due to the confined space near the brainstem, risk of hydrocephalus, and critical neurovascular structures.

These aneurysms are rare, accounting for **less than 1%-2%** of all intracranial aneurysms, but pose significant **surgical and endovascular challenges** due to their deep location and proximity to vital structures.

Classification

A ruptured PICA aneurysm can be classified according to anatomical, clinical, morphological, and therapeutic criteria. Below is a structured breakdown.

1. Anatomical Classification (by PICA Segment)

Segment	Name	Description
P1	Anterior medullary	From origin to inferior olive
P2	Lateral medullary	Around lateral medulla

Segment	Name	Description
P3	Tonsillomedullary	Near the cerebellar tonsil
P4	Telovelotonsillar	Near the tela choroidea and 4th ventricle
P5	Cortical	Distal cortical branches to vermis and hemisphere

- Most common aneurysm sites: **P1 and P2**, especially at the **vertebral-PICA junction**.

□ 2. Clinical Classification (Based on Rupture)

- Presents with **posterior fossa SAH** (subarachnoid hemorrhage), especially in the **cisterna magna** or **fourth ventricle**.
- Grading systems:
 - **Fisher Grade** (blood load on CT)
 - **Hunt and Hess Grade** (clinical severity)
 - **WFNS Grade** (GCS + focal deficit)

□ 3. Etiological Classification

- **Saccular (true) aneurysm**
- **Dissecting aneurysm** ← common in vertebrobasilar system
- **Fusiform aneurysm**
- **Mycotic aneurysm** (infective)
- **Pseudoaneurysm** (trauma/iatrogenic)

□ 4. Morphological Classification

- **Shape**: saccular, fusiform, dissecting
- **Size**:
 - Small: < 7 mm
 - Medium: 7-12 mm
 - Large: 13-24 mm
 - Giant: ≥ 25 mm
- **Neck width**:
 - Narrow-neck: < 4 mm
 - Wide-neck: ≥ 4 mm or dome-to-neck ratio < 2

□ 5. Radiological Appearance

- Identified by **CTA, MRA or DSA**
- Blood in **posterior fossa, fourth ventricle, cerebellomedullary cistern**
- Possible complications:
 - Obstructive hydrocephalus
 - Brainstem compression

6. Surgical Accessibility (Yasargil-style)

- **Surgically accessible:** vertebral-PICA junction
- **Surgically challenging:** distal PICA (P3-P5), near brainstem or 4th ventricle

7. Treatment-Based Classification

- **Microsurgical clipping**
- **Endovascular approaches:**
 - Coiling
 - Stent-assisted coiling
 - Flow diverters (select cases)
- **Parent artery occlusion**
- **Bypass with trapping** (dissecting/fusiform)
- Decision-making depends on:
 - Aneurysm morphology
 - Segmental location
 - Clinical status
 - Institutional expertise

Ruptured PICA aneurysms require individualized management based on aneurysm location, morphology, and patient factors.

Endovascular Treatment

Preferred for proximal PICA aneurysms (VA-PICA junction, anterior/lateral medullary segments)

Coiling techniques:

Selective coiling: For saccular aneurysms with narrow necks and preserved PICA origin

Balloon-assisted coiling: For wide-necked aneurysms

Stent-assisted coiling: For complex cases requiring parent artery preservation

Parent vessel occlusion (PVO):

Used for dissecting/fusiform aneurysms

Safe if collateral flow is confirmed

Endovascular Outcomes	
Proximal aneurysms	85–90% technical success, ≤5% procedural complications
Distal aneurysms	Higher recurrence (up to 25%), risk of cerebellar infarction

Surgical Treatment

Preferred for distal PICA aneurysms (tonsillomedullary to cortical segments)

Approaches:

Far-lateral/suboccipital craniotomy: For proximal aneurysms

Telovelar/retromastoid: For distal/cortical branches

Techniques:

Clipping: For saccular aneurysms with clear necks

Trapping with bypass: For fusiform/dissecting aneurysms

Surgical Outcomes	
Distal aneurysms	83% favorable outcomes (mRS 0-2)
Proximal aneurysms	Higher cranial nerve palsy risk (up to 20%)

Key Decision Factors

Factor	Endovascular	Surgery
Aneurysm location	Proximal PICA	Distal PICA
Morphology	Saccular, narrow neck	Complex, wide neck
PICA origin	Adjacent to aneurysm neck	Incorporated into dome
Clinical status	Poor-grade SAH	Mass effect symptoms

Complications

Brainstem ischemia: Risk from occlusion of medullary perforators (proximal PICA)

Cerebellar infarction: More common in distal PVO without collateral supply

Rebleeding: Higher risk in partially coiled aneurysms (8-12%)

Summary: Proximal ruptured PICA aneurysms are usually managed with endovascular coiling or PVO, while distal lesions are better suited for surgical clipping. Multidisciplinary evaluation is essential for optimal outcomes.

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