

Aqueductal stenosis diagnosis

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Accurate [aqueductal stenosis](#) diagnosis is critical for determining the appropriate treatment.

Key Diagnostic Methods

Clinical Presentation

- **Symptoms:**
 - [Headache](#) (often related to raised [intracranial pressure](#)).
 - [Nausea](#) and [vomiting](#).
 - [Gait disturbances](#).
 - [Cognitive decline](#) or [lethargy](#).
- **Infants:**
 - Rapid [head circumference](#) growth.
 - [Bulging fontanelle](#).

Neuroimaging Techniques

Modern imaging techniques are essential for diagnosing aqueductal stenosis and assessing its impact on CSF dynamics.

- **Magnetic Resonance Imaging (MRI):**
 - **T1 and T2-Weighted MRI:**
 - Visualizes ventricular dilation, often disproportionate to cortical atrophy.
 - Detects anatomical narrowing of the aqueduct.
 - **3D-CISS ([Constructive Interference in Steady State](#)):**

- High-resolution imaging to evaluate the aqueduct's structure.
- **Phase-Contrast MRI (PC-MRI):**
 - Quantifies CSF flow through the aqueduct.
 - Can detect reduced or absent flow, indicating obstruction.
 - Used to calculate aqueductal CSF stroke volume and resistance.
- **Computed Tomography (CT):**
 - May show ventricular enlargement in acute cases but lacks the detail of MRI.
 - Useful when MRI is contraindicated (e.g., pacemakers, metallic implants).
- **Cine MRI:**
 - Dynamic imaging synchronized with the cardiac cycle.
 - Evaluates pulsatile CSF flow, helping differentiate between communicating and obstructive hydrocephalus.

Pressure Monitoring (Rarely Used)

- **Invasive ICP Monitoring:**
 - Measures intracranial pressure to assess the severity of hydrocephalus.
 - Rarely required with advanced imaging techniques.

Differential Diagnosis

- Must distinguish from other causes of hydrocephalus:
 - Communicating hydrocephalus.
 - Normal pressure hydrocephalus.
 - Tumors, cysts, or vascular malformations compressing the aqueduct.

Key Findings on Imaging

Imaging Feature	Indication
Ventricular enlargement	Obstruction causing upstream dilation.
Narrow aqueduct on 3D-CISS MRI	Direct visualization of stenosis.
Reduced/absent CSF flow on PC-MRI	Functional confirmation of obstruction.
Periventricular hyperintensity	CSF pressure effects seen on T2-weighted MRI.

Next Steps After Diagnosis

Treatment Options

- **Endoscopic Third Ventriculostomy (ETV):**
 - Creates a bypass for CSF flow, avoiding the aqueduct.
- **Ventriculoperitoneal Shunt:**
 - Diverts excess CSF to another body cavity.

Monitoring

- Regular follow-up imaging to assess CSF dynamics.

- Neurological and developmental monitoring, particularly in pediatric cases.

Conventional MR imaging provides useful information in AS, because it may show triventricular dilation, CSF pathway obstruction at the aqueductal level on sagittal T2 sequences, downward bulging of the floor of the third ventricle (3rd V), anterior bulging of the 3rd V, etc. ¹⁾.

But aqueductal stenosis (AS) is not always detected by conventional magnetic resonance imaging (MRI).

One-third of NPH patients with AS presented Rout >12 mmHg/ml/min ²⁾.

Phase contrast magnetic resonance imaging for cerebral aqueduct resistance

Phase contrast magnetic resonance imaging for cerebral aqueduct resistance

¹⁾

Kehler U, Regelsberger J, Gliemroth J, et al. Outcome prediction of third ventriculostomy: a proposed hydrocephalus grading system. Minim Invasive Neurosurg 2006;49:238 -43

²⁾

González-Martínez EL, Santamarta D. Does aqueductal stenosis influence the lumbar infusion test in normal-pressure hydrocephalus? Acta Neurochir (Wien). 2016 Oct 11. PubMed PMID: 27730385.

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