Cerebrospinal fluid venous fistula

- Irregular Cervicothoracic Nerve Sheaths on Digital Subtraction Myelography: A CSF-Venous Fistula Mimic
- Simulation of cerebrospinal fluid (CSF)-venous fistula embolization in a swine model: A technical video
- Systematic Review of the predictive value of negative brain or low probability brain MRIs in patients with CSF venous fistulas
- A Case Report of an Adverse Outcome: Development of a Dural Arteriovenous Fistula Following Foramen Magnum Decompression for Chiari Malformation
- Clinical Features and Diagnosis of Spontaneous Intracranial Hypotension
- Treatment of Spinal CSF Leaks and Fistulas
- Spinal CSF leaks in spontaneous intracranial hypotension: A single-institution analysis of incidence, typology and treatment outcomes
- latrogenic dural arteriovenous fistula formation as a rare complication of external ventricular drain placement: institutional review of 16 cases

A cerebrospinal fluid (CSF) venous fistula is an abnormal connection between the subarachnoid space and a nearby vein, allowing CSF to leak directly into the venous system without passing through the dura.

Key Features

No dural tear is visible, unlike other CSF leaks.

It causes spontaneous intracranial hypotension (SIH) by diverting CSF into a vein, reducing CSF volume and pressure.

Most commonly located in the thoracic spine, near spinal nerve roots.

Clinical Significance

Presents with orthostatic headaches, nausea, neck stiffness, and in some cases cognitive or balance disturbances.

Often missed on standard MRI, requiring advanced imaging like digital subtraction myelography (DSM) or dynamic CT myelography in lateral decubitus.

Diagnosis and Treatment

Diagnosis relies on detecting the fistula site using invasive imaging techniques.

Treatment may involve surgical ligation of the fistula or targeted epidural blood patches, though surgery is often required for definitive closure.

Systematic reviews

The article titled "Systematic Review of the Predictive Value of Negative Brain or Low Probability Brain MRIs in Patients with CSF Venous Fistulas" (American journal of neuroradiology) is a systematic review analyzing data from nine studies (898 patients) to assess how reliably negative brain MRI or low-probability MRI scores (Bern, Mayo) can rule out cerebrospinal fluid (CSF) venous fistulas, a surgically treatable cause of spontaneous intracranial hypotension (SIH)¹⁾.

The authors found that although negative brain MRI has a high negative predictive value (89%), CVFs were still identified in a notable number of patients—especially when using the Mayo score (NPV only 65%).

The authors conclude that negative imaging does not exclude CVF, and invasive spinal imaging (e.g., DSM, dynamic CT myelography) should be considered in cases with strong clinical suspicion. This is especially relevant for neurosurgeons, as surgical ligation of CVFs may be necessary.

All authors are affiliated with Cedars-Sinai Medical Center (Los Angeles), with Dr. Wouter I. Schievink, a neurosurgeon, being a leading expert in the field of CSF leaks.

This so-called systematic review by Tay et al. (AJNR, June 2025) ambitiously sets out to clarify the diagnostic value of negative brain MRI in detecting cerebrospinal fluid venous fistulas (CVFs), yet ends up as a textbook example of how quantitative gloss can't save a weak clinical premise.

□ Flawed Foundation: Heterogeneity Buried Under Pooled Numbers

The authors admit up front that their review suffers from substantial heterogeneity in reference standards, imaging protocols, and scoring systems across studies. Yet, they proceed to pool data as if they were comparing apples to apples—when in reality, they're juggling an orchard of inconsistencies. The Bern and Mayo scores are fundamentally different tools, and merging their results under the same meta-analytical umbrella is methodologically indefensible.

Diagnostic Performance? Or Statistical Mirage?

An NPV of 89% for negative brain MRI is presented as clinically reassuring. But what does that mean in a low-prevalence population, where even random guesses produce high NPV? The authors make no serious attempt to contextualize this value against pre-test probabilities, clinical severity, or the dire consequences of missed CVFs.

Even worse: they downplay the real-world implication that up to 35% of patients with "lowprobability" MRI scores still had a fistula. If your scoring system misses one in three patients, it is not a diagnostic aid — it's a liability.

U What Is "Low Probability" Anyway?

The review's use of the Bern and Mayo scoring systems is shaky. These tools were not designed to exclude CVFs—they were created to stratify general SIH suspicion, often with dural leaks in mind. Using them to estimate the likelihood of a specific leak subtype (venous fistulas) is a classic case of misapplied tools, with conclusions that border on tautology.

□ The Neurosurgical Perspective: Where's the Relevance?

Despite being authored by a team from a prestigious center (Cedars-Sinai), including Dr. Wouter Schievink—a neurosurgeon well-known in the field—the review fails to provide any actionable guidance for surgical decision-making. There is no discussion of:

How to select patients for surgical exploration despite negative imaging.

What intraoperative findings to expect.

How to interpret "false negatives" in the context of patient disability.

For a condition where the definitive solution is surgical ligation, this omission is not just a gap—it's a gaping hole.

Conclusion: A Review That Confirms What We Already Knew-And Still Gets It Wrong

That patients with CVFs can have negative brain MRIs is not new. What this review adds is a false sense of security about when to stop looking. Instead of advocating for clinical vigilance and targeted imaging, it wraps known facts in misleading statistics and undercuts its own relevance by drowning in weak methodology.

This is not a clarifying contribution—it's diagnostic noise dressed up as evidence-based guidance.

Verdict:

Methodologically shaky, clinically misleading, and surgically irrelevant. A missed opportunity from a group that should have known better.

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Tay ASS, Maya MM, Kranz PG, Madhavan AA, Schievink WI. Systematic Review of the predictive value of negative brain or low probability brain MRIs in patients with CSF venous fistulas. AJNR Am J Neuroradiol. 2025 Jun 18:ajnr.A8884. doi: 10.3174/ajnr.A8884. Epub ahead of print. PMID: 40533349.

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