

Ventriculitis Diagnosis

Often the surgery itself can cause “chemical meningitis” or postoperative meningitis, particularly posterior fossa surgeries or in the presence of intraventricular hemorrhage. The CSF leucocyte and CSF glucose values can look very similar to infectious meningitis making it hard to distinguish these entities based on these parameters.

The following could help in confirming underlying EVD infection.

- Hypoglycorrhachia (low CSF glucose): ratio of [CSF glucose]/[blood glucose] < 0.2
- CSF pleocytosis > 1000 or rising Cell index
- CSF protein was not a reliable predictor for incipient ventricular catheter infection ¹⁾.

Routine CSF sampling: CSF sampling should be performed only when symptoms appear. There is no evidence of benefit to obtaining CSF cultures or cell count at the time of EVD insertion (false positive cultures may occur from contamination) ²⁾.

In a febrile patient with a [ventriculostomy](#), diagnosing or excluding bacterial or microbial [ventriculitis](#) is difficult, as conventional markers in the analysis of cerebrospinal fluid (CSF) are not applicable due to presence of blood and [inflammation](#).

The diagnostic utility of CSF leukocyte count, glucose, and protein is limited, as noninfectious entities like [intracranial hemorrhage](#) and [neurosurgical procedures](#) can also cause abnormalities in these parameters.

Data from a large sample of CSF studies in patients with ventriculostomy indicate that no single value of [cerebrospinal fluid lactate](#) provided both [sensitivity](#) and [specificity](#) high enough to be regarded as a reliable test ³⁾.

Lumbar puncture

Usually NOT recommended. ✖ May be hazardous in [obstructive hydrocephalus](#) (HCP) with a nonfunctioning shunt. Often does not yield the pathogen even in communicating HCP, especially if the infection is limited to a ventriculitis. If positive may obviate a shunt tap.

The cerebrospinal fluid (CSF) can be collected by the [EVD](#) or by [lumbar puncture](#) (LP). If only one sample is analyzed, the diagnosis might be dubious or false-negative.

In a study of Finger et al. the CSF analysis exclusive from the EVD has a low sensibility and negative predictive value. CSF collected from LP has a sensibility 2.18 times higher than EVD ⁴⁾.

Radiology

CT

[Ependymal enhancement](#) when it occurs is diagnostic of [ventriculitis](#).

MR

Radiological studies have demonstrated the diagnostic ability of magnetic resonance (MR) imaging, including [diffusion-weighted imaging](#) ^{5) 6) 7)}.

Characteristic findings include ventricular debris, periventricular hyperintensity, and diffusion restriction in the debris. However, in patients who are unstable to undergo MR scans, CT scans can still be informative. The irregular debris morphology is highly specific for purulent material ⁸⁾.

The ventricular debris sinks towards the [occipital horns](#) with the patient supine in the scanner. The surface of the viscous debris is often round or irregular, in contrast to the straight level of acute intraventricular blood.

The 'lodge sign' is observed, a radiological phenomenon not previously described: in the right lateral ventricle, where the debris diameter exceeds the occipital horn, the debris is 'lodged', separating the CSF anteroposteriorly. On the left, CSF is also seen isolated at the tip of the occipital horn, by the overlying debris. The 'lodge sign' is likely to be underreported previously, as the shape of the small purulent material was not studied in detail.

In patients whose clinical history is unclear and who are unsafe to undergo MRI scan, such as this case, the 'lodge sign' can differentiate pyogenic ventriculitis from acute intraventricular hemorrhage, both of which require prompt and specific investigations and treatments ⁹⁾.

References

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