Idiopathic normal pressure hydrocephalus diagnosis

- Idiopathic Normal-Pressure Hydrocephalus Revealed by Systemic Infection: Clinical Observations of Two Cases
- Postoperative changes in ventricular cerebrospinal fluid biomarkers with correlation to clinical outcome in idiopathic normal pressure hydrocephalus
- Deformation of brain in normal pressure hydrocephalus is more readily associated with slow vasomotion rather than heartbeat related pulsations of intracranial pressure
- Diagnostic efficacy of radionuclide scintigraphy in detecting lumboperitoneal shunt obstructions in idiopathic hydrocephalus and intracranial hypertension
- Neurocognitive effects of CSF biomarkers in idiopathic normal pressure hydrocephalus patients undergoing VP shunt placement
- Clinical Features and Diagnosis of Normal Pressure Hydrocephalus
- Radiographic Evaluation of Normal Pressure Hydrocephalus
- Value of biomarkers in the prediction of shunt responsivity in patients with normal pressure hydrocephalus

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Diagnosis is based on the evaluation of Idiopathic normal pressure hydrocephalus clinical features combined with an MRI assessment, evaluation of cerebrospinal fluid dynamics by different methods such as a tap test, lumbar infusion test (LIT), and External lumbar cerebrospinal fluid drainage (ELD).

Screening for idiopathic normal pressure hydrocephalus in the elderly presenting after falls can possibly identify iNPH patients in the earlier stage who may benefit more from surgical treatments [1].

Patients often present to the neurosurgeon frustrated and desperate after a long preoperative course. It is important to acknowledge the uncertainty regarding Idiopathic normal pressure hydrocephalus diagnosis [2].

There is no accurate test for diagnosing normal pressure hydrocephalus or for screening for patients who will benefit from shunt surgery.

Shunting is possibly effective in iNPH (96% chance subjective improvement, 83% chance improvement on timed walk test at 6 months) (3 Class III). Serious adverse event risk was 11% (1 Class III). Predictors of success included elevated Ro (1 Class I, multiple Class II), impaired cerebral blood flow reactivity to acetazolamide (by SPECT) (1 Class I), and positive response to either External lumbar cerebrospinal fluid drainage (1 Class III) or repeated lumbar punctures. Age may not be a prognostic factor (1 Class II). Data are insufficient to judge efficacy of radionuclide cisternography or aqueductal flow measurement by MRI.

There is limited Class I evidence that impaired cerebral blood flow (CBF) reactivity to acetazolamide is a predictor of successful CSF shunting, but Single-photon emission computed tomography (SPECT) is not a practical screening tool for NPH.

Imaging

Idiopathic normal pressure hydrocephalus Imaging

see Disproportionately enlarged subarachnoid space hydrocephalus.

Fewer centrum semiovale enlarged perivascular spaces may be a diagnostic biomarker for idiopathic normal pressure hydrocephalus diagnosis. This pattern may be caused by mechanical obstruction due to upward displacement of the brain leading to reduced glymphatic clearance [3].

Psychomotor Tasks

Although gait is the primary indicator for treatment candidacy and outcome, additional monitoring tools are needed. Line Tracing Test (LTT) and Serial Dotting Test (SDT), two psychomotor tasks, have been introduced as potential outcome measures [4].

Lumbar puncture for idiopathic normal pressure hydrocephalus diagnosis

see Lumbar puncture for Idiopathic normal pressure hydrocephalus diagnosis.

Pressure recording

see Idiopathic normal pressure hydrocephalus intracranial pressure monitoring.

Alzheimer disease (AD)-related pathology was assessed in cortical biopsy samples of 111 patients with idiopathic normal-pressure hydrocephalus. Alzheimer disease hallmark lesions amyloid beta (Aβ) and hyperphosphorylated tau protein (HPtau)-were observed in 47% of subjects, a percentage consistent with that for whole-brain assessment reported postmortem in unselected cohorts. Higher-immunostained area fraction of AD pathology corresponded with lower preoperative mini mental state examination scores. Concomitant Aβ and HPtau pathology, reminiscent of that observed in patients with AD, was observed in 22% of study subjects. There was a significant correlation between Aβ-immunostained area fraction in tissue and Aβ42 (42-amino-acid form of Aβ) in cerebrospinal fluid (CSF). Levels of Aβ42 were significantly lower in CSF in subjects with concomitant Aβ and HPtau

pathology compared with subjects lacking pathology. Moreover, a significant correlation between HPtau-immunostained area fraction and HPtau in CSF was noted. Both HPtau and total tau were significantly higher in CSF in subjects with concomitant Aβ and HPtau pathology compared with subjects lacking pathology. The 42-amino-acid form of Aβ (Aβ42) and HPtau in CSF were the most significant predictors of the presence of AD pathology in cortical biopsies. Long-term follow-up studies are warranted to assess whether all patients with idiopathic normal-pressure hydrocephalus with AD pathology progress to AD and to determine the pathologic substrate of idiopathic normal-pressure hydrocephalus [5].

Biopsy

Biopsy for Idiopathic normal pressure hydrocephalus diagnosis.

Biomarkers

Idiopathic normal pressure hydrocephalus Cerebrospinal fluid biomarkers

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Oike R, Inoue Y, Matsuzawa K, Sorimachi T. Screening for idiopathic normal pressure hydrocephalus in the elderly after falls. Clin Neurol Neurosurg. 2021 Apr 24;205:106635. doi: 10.1016/j.clineuro.2021.106635. Epub ahead of print. PMID: 33906000.
2)
Subramanian HE, Mahajan A, Sommaruga S, Falcone GJ, Kahle KT, Matouk CC. The subjective experience of patients undergoing shunt surgery for idiopathic normal pressure hydrocephalus. World Neurosurg. 2018 Jul 4. pii: S1878-8750(18)31425-6. doi: 10.1016/j.wneu.2018.06.209. [Epub ahead of print] PubMed PMID: 29981467.
3)
Switzer AR, Graff-Radford J, Gunter JL, Elder BD, Jones DT, Huston J, Jack CR, Cogswell PM. Patients with normal pressure hydrocephalus have fewer enlarged perivascular spaces in the centrum semiovale compared to cognitively unimpaired individuals. Clin Neurol Neurosurg. 2024 Jan 17;237:108123. doi: 10.1016/j.clineuro.2024.108123. Epub ahead of print. PMID: 38262154.
4)
Rossetti MA, Piryatinsky I, Ahmed FS, Klinge PM, Relkin NR, Salloway S, Ravdin LD, Brenner E, Malloy PF, Levin BE, Broggi M, Gavett R, Maniscalco JS, Katzen H. Two Novel Psychomotor Tasks in Idiopathic Normal Pressure Hydrocephalus. J Int Neuropsychol Soc. 2016 Mar;22(3):341-9. doi: 10.1017/S1355617715001125. Epub 2016 Jan 28. PubMed PMID: 26817685.
5)
Elobeid A, Laurell K, Cesarini KG, Alafuzoff I. Correlations Between Mini-Mental State Examination Score, Cerebrospinal Fluid Biomarkers, and Pathology Observed in Brain Biopsies of Patients With Normal-Pressure Hydrocephalus. J Neuropathol Exp Neurol. 2015 May;74(5):470-479. PubMed PMID: 25868149.